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TREATISE ON THE DISEASES OF WOMEN

FOR THE USE OF STUDENTS AND PRACTITIONERS

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BY

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THIRD EDITION, REVISED AND ENLARGED
WITH 290 ENGRAVINGS AND 4 PLATES IN COLORS

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TO

THOMAS KEITH, M. D., LL. D., F. R. C. S. E.,

THIS WORK IS DEDICATED

AS A TRIBUTE TO HIS ACHIEVEMENTS IN SURGERY,

HIS JUSTICE AND COURTESY TO THE MEDICAL PROFESSION OF AMERICA,

AND AS AN ACKNOWLEDGMENT OF HIS KINDNESS TO THE AUTHOR.

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PREFACE TO THE THIRD EDITION.

In no department of medicine have more rapid and greater strides been made during the present decade than in gynecology. During this period many things new and useful have been added to the science and the art, while much that is both old and new deserves to be forgotten. To preserve and present to the student and practitioner that which his own experience and that of the highest authorities in this country and abroad have demonstrated to be worthy of their confidence, has been the author's aim in the preparation of this edition.

In the discussion of injuries of the pelvic floor he has endeavored to rearrange the varieties so that they could be more clearly comprehended. The surgical treatment has been simplified and otherwise improved, and more fully illustrated by drawings from the living subject and the cadaver.

Vaginal and abdominal hysterectomy have been brought fully up to date, and complete descriptions and illustrations given of the approved methods of performing these operations.

The control of hæmorrhage in all surgical procedures by compression and electric heat has been made practical and perfect in all its details, so that it now in the author's practice takes the place of the ligature. This contribution to surgery is believed to be of great value not alone to the gynecologist, but to the general surgeon as well.

The surgical treatment of uterine displacements is fully considered and its true value estimated.

The use of the endoscope and cystoscope is so described as to bring these instruments more completely within the grasp of the general practitioner, thus enabling him to make diagnoses otherwise impossible.

The illustrations have been in charge of Robert L. Dickinson, M. D., who has given up much time to the development of accurate and artistic drawing of medical subjects.

Prof. Joseph H. Raymond, who is associated with the author in teaching gynecology, has had entire charge of carrying the work through the press.

To these gentlemen, and to the profession at large, sincere thanks are here tendered by

The Author.

PREFACE TO THE SECOND EDITION.

The demand for a second edition of this work, and the fact that it is used as a text book in many of the leading medical schools, are very gratifying to the author, who takes this opportunity to thank the members of the medical profession for this evidence of their approbation.

Every effort has been made to improve this edition by a thorough revision and the addition of much new material.

New chapters have been added on ectopic gestation, diseases and injuries of the ureters, vesical hernia and its surgical treatment, and the latest views of the author have been given in the discussion of laparotomy, ovaritis, and injuries of the cervix uteri and pelvic floor.

The publishers have, at great expense, produced a large number of new and handsome illustrations, and in every respect have made the work a perfect sample of their art.

THE AUTHOR.

April 15, 1892.

PREFACE.

THIS book was written for the purpose of bringing together the fully matured and essential facts in the science and art of gynecology, so arranged as to meet the requirements of the student of medicine, and be convenient to the practitioner for reference. In the plan adopted, the diseases peculiar to women are, as far as possible, divided into three classes. The first class comprises those which occur between birth and puberty; the second, those between puberty and the menopause; and the third, those which come after the menopause.

Each subject is briefly described, and histories of cases, typical and complicated, are given as illustrative of the disease or injury under consideration, together with the author's method of treatment. The number of illustrative cases given depends upon the practical importance of the subject and the ability to make it more plain by the use of illustrations.

In carrying out this plan, the history of gynecology and the discussion of all unsettled questions have been omitted, as being at variance with the plan adopted.

Credit has been given as far as possible to those who have made original discoveries, but a vast number of original workers have been passed unnoticed for want of time and space even to name them.

To the medical student, history has no value until he has mastered the rudiments of the science and the art, and the practitioner can find in the works of reference all the historical facts which he may seek.

The author has ventured to give his own views and methods pertaining to practical matters, believing that while they may differ to some extent from the general literature of the day, they will be found reliable in practice and may be of interest to the specialist.

Marginal references have not been made, because all selections from the literature that have been incorporated in this work are those already well established and familiar to the gynecologist, and foot-notes only embarrass the reader who is seeking for the facts alone.

Acknowledgments are due to my associates — Dr. J. H. Raymond, who has rendered valuable aid in the preparation of the work, and Dr. R. L. Dickinson, who has made the drawings for the original illustrations.

THE AUTHOR.

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NOTE.—All illustrations not credited are from original drawings by Robert L. Dickinson, M. D., or were prepared under his supervision, excepting cuts of instruments and Figs. 93, 94, 95, 97, 242, and 243, by J. M. Van Cott, M. D., and Figs. 240 and 241, by A. H. P. Leuf, M. D.

DISEASES OF WOMEN.

CHAPTER I.

METHODS OF OBSERVATION.

A THOROUGH familiarity with the means and methods of investigation is the first requisite in acquiring knowledge. The art of observation, which is simply the systematic use of the mental and physical faculties to obtain facts, should be made an essential part of the preliminary training of every student of medicine. From this point of view, the subject which we have to consider resolves itself into two divisions: first, the ways and means of investigation; and, second, the objects to be studied.

Before approaching the study of gynecology, it is taken for granted that much experience and practice have been attained by the student in the art of investigation. The experience of everyday life, from infancy onward, and the ordinary school education obtained before beginning the study of medicine, tend to develop and cultivate the perceptive faculties. Still, the physician and surgeon require special training in the art of observation. To accurately note the structure, form, color, general proportions, and expressions of the human body in health, is the first lesson which every student of medicine should learn. This is the most important step toward the attainment of a practical knowledge regarding the functions of the human body, and its deformities, diseases, and injuries. The correct, rapid, and thorough observer has from the outset great advantages. Important and necessary as this branch of education is, it is almost wholly neglected in schools and colleges. The chief occupation of teachers appears to be to impart knowledge already in existence, rather than to qualify the student to observe and think for himself.

Special attention should be given to this art of observation, because it is the key to science and the first exercise in practice. The systematic way in which knowledge is presented in books and by oral instruction enables the student to acquire facts in all branches of learning, and to classify them. The mental training obtained in the study of mathematics and logic prepares men to make reasonable deductions from the facts obtained; but in institutions of learning, thorough training in the art of observation is seldom given.

This lack of preliminary education adds greatly to the labors of the student, because he is obliged to acquire knowledge while he is not in possession of the means of obtaining it, and it is mainly because of this defect that practitioners of medicine are led into error in making diagnoses. They fail to observe all the facts, and hence their deductions are liable to be incorrect.

Acute, clear perception is a gift which all do not possess in a high degree, but it can be cultivated by those of ordinary intelligence, and it should be by those who intend to practice medicine. The practical study of the elements of natural science, which should constitute a large share of the early education of those destined for the profession of medicine, aids much in cultivating the faculties concerned in observation. So also the arts, especially drawing, painting, and sculpture, help to qualify for the actual in professional life. The trained eye and hand of the artist are most valuable in acquiring the art of medicine and surgery, and a share of the days of youth spent at an art-school will save much time and perplexity in the medical school as well as in subsequent professional life.

The first lesson is to obtain a familiarity with the general appearance of the body in health, its structure and the uses of the various organs, the process of development, the slight deviations from the ideal or highest type which occur within the range of health, and finally the relations of the being to his environment or conditions of life. A portion of this subject will be fully discussed in the chapter on the development and structure of the sexual organs of woman, and the conditions of life which are suitable to her development, growth, and maintenance. Subsequently the derangements of the body from disease and injury will come in for the greater portion of time and attention. Here it is that the highest perceptive power is needed, and the most painstaking attention to observation.

The fact should be kept clearly in mind that a knowledge of the science of medicine does not give skill in the art of practice, however much it may help in acquiring that art. Men profoundly versed in the science of medicine may be poor practitioners; and others, whose knowledge of the science is very limited, may attain some reputation in practice; but the best qualified physician is he who knows most of both the science and the art. The subject for present consideration is the method of investigation to be adopted in practicing the art of gynecology. Before beginning the actual work of examining patients, it is necessary to know how to do so.

There are several methods of investigating the sick and injured given in text-books and taught in the medical schools, but most of these are better adapted to general practice than to special departments of medicine. The methods which I desire to present here are circumscribed, and perhaps less complicated, because they are limited to the diseases peculiar to women.

In examining patients it is well to first settle definitely in the mind the object to be attained and how to attain it. Some rational system of investigation should be mastered in all its details before undertaking actual practice. To engage in clinical study without such preparation is like trying to read a language without knowing its alphabet.

The system advised is: first, to obtain all the facts regarding the case in hand; second, to arrange these facts in their natural relation to one another; and, finally, to make deductions from the data thus obtained. These suggestions will be easily remembered in the following order and association: observation, classification of things observed, and conditions indicated by the sum of the information obtained.

The examination of a patient should begin by a general inspection; and, in order to make that inquiry complete and profitable, certain questions should be raised in the mind of the examiner; such, for example, as, What is the general appearance of the patient under observation? What size? Regular or defective in general outline? Lean or corpulent? What temperament? Is the face pale or flushed? Languid or vigorous? Sad or cheerful? Calm or excited? Intelligent or stupid? What diathesis is indicated, if any? In short, does the general physiognomy indicate health or disease?

All these interrogations are made while looking critically at the patient. There are so many questions to be answered in this connection, that one may find some difficulty in promptly remembering them; but by constant practice the mind and eye can be trained to take advantage of a rule of observation employed by critical investigators in other arts, which is this: having a type of normal organization in mind, the observer is able to scan a given case, and detect any deviation from that standard of healthy formation and appearance. The artist, in looking at a picture or statue, does not necessarily question every line of the drawing or form by itself, but his trained eye catches any defects that there may be in the work before him.

The classification of facts is simply putting together those which are similar in character. The arrangement of material things in groups is familiar to all. A well-arranged library, in which all books pertaining to a given subject are placed side by side, is a fair illustration of this kind of classification. Facts and ideas can be arranged in the mind upon precisely the same principle. The advantage of classification is that it aids comprehension and memory. By recalling one group of facts which have been associated in the mind, the rest will follow in easy and natural order. There are two methods of classifying the information contained in the clinical history of a patient. One is to obtain all the facts possible, and then to arrange them in order. The other is to classify them at each step of the examination. The former method requires a mental grasp and tenacity which few possess, and therefore I would advise the latter.

The information obtained by inspection may be classed under four heads: 1. The original character of the organization, whether perfect or imperfect in structure and function. 2. If imperfect, whether from imperfect development, causing lesions of form or lesions of structure, or from inherited or acquired disease, and inherited tendencies to disease, known as diathesis. 3. Evidences of disease, expressed in the face, either acute or chronic. 4. The temperament; which simply means the preponderance of a certain portion or portions of the organization.

To illustrate the value of this process of general inspection of patients, the partial history of a case seen in private practice will suffice. A lady called to consult me regarding her son, a little fellow seven years of age. After a very brief survey of the patient, I saw enough to satisfy me that he had recently had scarlatina, and that when a child he had suffered from sore eyes, and that his father had been subject to rheumatic pains in years gone by. The mother acknowledged that I was right in every particular. A glance at the boy showed that exfoliation of the cuticle, which occurs after scarlatina, was still going on; the face was pale and puffy, indicating commencing dropsy from acute nephritis, a sequel of the eruptive fever. I also noticed that he had a scar upon the cornea of each eye, the result of a former keratitis. The form of his nose and the character of his teeth indicated an inherited syphilis; and from the appearance of his mother and other facts known to me, I presumed that the father was the one who had transmitted the specific disease.

The age of the patient should be ascertained, because that suggests the possible existence of the diseases which are likely to occur at certain periods of life. Care should be taken to compare the real and apparent age, in order to ascertain if the patient is prematurely old, or well preserved. This interrogation will also serve to keep in mind the fact that, in early life, acute diseases prevail, while degenerations are usually limited to advanced life.

It is important to know the social relations of a patient—that is, whether she is married or single. If married, she is liable to the diseases and accidents attendant upon child-bearing. If she has never been pregnant, her sterility may have resulted either from choice, or because of some defect in her organization. Women who are single are, by reason of that fact, limited in the range of diseases of their sexual organs, and this may be taken for granted unless evidence to the contrary is obtained.

Having made a general inspection of a given case, and ascertained the age and social relations, an examination of the various portions of the body should next be made in systematic order. To do this conveniently, one group of organs or one system should be examined at a time. The various systems are classified as follows:

THE NERVOUS, NUTRITIVE, MUSCULAR, AND SEXUAL SYSTEMS.

The first three are subdivided as follows: The nervous has two grand divisions, the cerebro-spinal and organic. The nutritive has four subdivisions, the digestive, circulatory, lymphatic, and excretory; and the third has the osseous and muscular.

The present purpose is to outline the methods of investigating the sexual system, but, in order to do that successfully, it is necessary to be able to examine the whole body. No one can be a trustworthy specialist without having a thorough knowledge of the whole organization. All the parts of the body are so bound together by mutual relations that one can not accurately diagnosticate the diseases of one portion without knowing the condition of all the others. On account of that fact I must refer to the principles upon which the examination is made of parts other than the sexual system.

Briefly, it may be stated that the two principal subjects of inquiry are the condition of the functions and the structure of the organs under examination. Perverted function of the cerebro-spinal division of the nervous system is manifested through derangements of sensation and motion, and abnormal states of the organic nerves are indicated when nutrition is deranged, while the organs of nutrition are free from structural disease. The condition of the circulatory system is indicated by the color of the skin and mucous membranes, the character of the pulse, and the heart-sounds.

The general nutrition may be estimated by the appetite for food, the excretions, and the state of the tissues generally. These are meager hints, but, if kept in mind while examining cases in the department of gynecology, will guard against the mistake of overlooking affections of the general system, which might modify or cause diseases of the sexual system.

In applying the principles already hinted at in the investigations of special diseases of the sexual organs, we find that morbid action is manifested by symptoms and physical signs. The symptoms may be classed under three heads: First, deranged nerve-action; second, deranged functions of the organs affected; and, third, modified locomotion.

First Class (nerve-symptoms).—Pelvic pains not specially localized; sacral pain; pain of certain pelvic organs; pains beginning in the pelvis and radiating to other parts of the body.

Second Class.—Derangements of function, such as deranged menstruation; sterility; abnormal discharges; deranged function of the bladder and rectum.

Third Class.—Aggravation of any or all of the above-named symptoms, by standing, walking, or other muscular exercise.

Keeping this classification in mind, questions will suggest themselves, the answers to which will determine the presence or absence of these symptoms. One should know the symptoms which belong to a given disease, and then ascertain if they are present by asking questions of the patient. Correct testimony will more surely be obtained in this way than by depending upon the voluntary statements of the person examined.

The following plan will be of service in obtaining the symptoms referred to in the three classes given above: First, ask if the patient has pain and where it is located. Ascertain also if this pain is connected with any of the functions of the pelvic organs. Then obtain the history of the functions of the sexual organs, in the past and present. These facts can be obtained from the patient herself, aided perhaps by some one who knows her well. Some practice is necessary to acquire skill in taking testimony, the value of which depends largely upon the physician's ability to make the patient answer his questions correctly. Such questions as the following regarding the menstrual function should be asked: At what age was the menstrual function first established? At what periods of time has it recurred? How long does it continue each time? What are the quantity and character of the flow? Is it attended with pain, and if so, where is the pain located, and at what time does it occur in relation to the menstrual flow? Has menstruation always been attended with pain, or only for a limited period in the history of that function? And, finally, is menstruation attended with derangements of any of the other functions of the body?

From the answers to these questions two points can be decided: First, whether menstruation has been performed normally during the whole or part of the patient's menstrual period of life; and, second, if any derangement of that function exists, whether it be in character, recurrence, duration, or quantity.

Next in order comes the history of reproduction. Has the patient had children, and if so, how many, and when? Has she miscarried? If she has, at what period of gestation, and at what time in relation to birth of living children if she has had any? Was there anything abnormal in her pregnancies, confinement, or recovery from labor; if so, what? The answers to these questions will determine whether the present conditions date back to some of the diseases or accidents of pregnancy or parturition. If the history so far obtained indicates any disease or functional derangement of the sexual organs, and there is any accompanying affection of the general system, the question arises, regarding the relations which they sustain to one another. That question can frequently be settled by ascertaining which of the two affections, the local or general, appeared first. The one which precedes is frequently the cause of that which follows.

Thus far we have been dealing with symptoms which, as a rule, reveal only derangements of function. They are but expressions of disease, and do not in all cases indicate the conditions of the organization which cause the derangement of function.

This brings us to the final division of our subject, viz., the physical signs of disease. These are the physical evidences of change of structure. There are exceptions to the general rule that these physical evidences are always present, but they are few in number, and therefore may be omitted in our general consideration of the subject.

The changes of structure and organization in the sexual organs, which are expressed by physical signs, are as follows:

Changes of position, form, size, consistence, composition, color or appearance, and degree of sensitiveness.

The means of obtaining physical signs are the touch—single or bimanual—palpation, percussion, speculum, sound, probe, curette, exploring-needle, uterine dilator, and microscope.

The art of employing these means next claims attention.

EXAMINATION BY THE TOUCH.

This examination is most conveniently practiced when the patient is placed upon a suitable table. One that is thirty-three inches high, forty-three inches long, and twenty-three inches wide, having a projection on the right-hand corner upon which to rest the feet, answers better than any table or chair that I have ever seen.

The patient should be placed upon the back, with the pelvis as near the end of the table as possible, permitting the heels to rest upon the table also, while the thighs are flexed upon the body and the legs upon the thighs. A sheet held by the edge in both hands is drawn over the limbs from the feet upward, at the same time that the skirts are pushed up out of the way. This protects the patient from exposure.

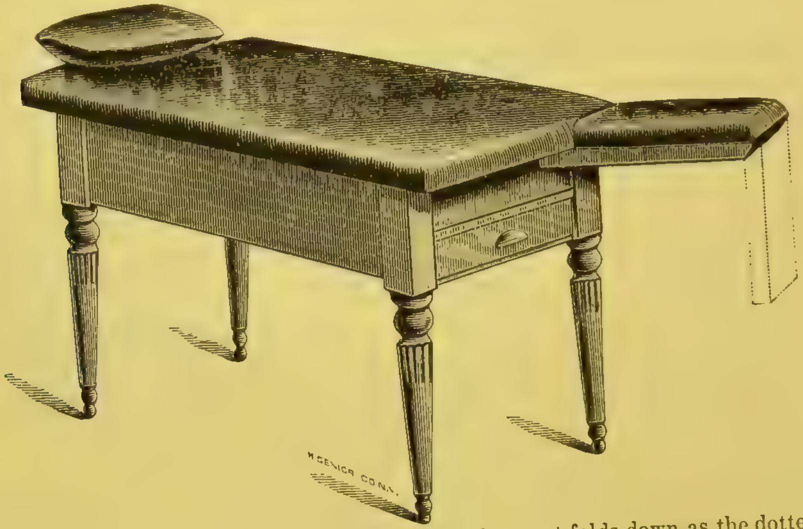


FIG. 1.—Examining table. (The upper part of the foot-rest folds down as the dotted lines show, and the support can be pushed in.)

In this examination the index-finger of the right hand is generally employed, but both right and left should be educated, because it is sometimes difficult to examine that side of the pelvis which faces the back of the hand used. In critical cases, therefore, it may be necessary to employ both hands, first one and then the other, in order to complete the examination. In the majority of cases it is requisite to employ the bimanual method, as it is termed—that is, while one or two fingers are introduced into the vagina, the fingers of the other hand are placed upon the abdomen at the pelvic inlet, and by pressure the parts are brought down to within near reach of the finger in the vagina. Fig. 2 illustrates the mode of making this examination. This method is quite satisfactory in spare patients with lax abdominal muscles; but when the muscles are tense, and when the walls of the abdomen contain a thick layer of adipose tissue, the examiner will find great difficulty in practicing it. In such unfavorable conditions, when the diagnosis is obscure, much will be gained by using an anæsthetic. Examination of the pelvic organs through the rectum is of great value. In this method the touch is practiced in the same way as in that already described.

There are other methods practiced, such as introducing two fingers into the vagina, the index and the middle; and the introduction of the whole hand into the vagina or into the rectum. Simon's method is to first dilate the sphincter-ani muscle, and then pass the whole hand into the rectum as far up as need be. Extraordinary advantages have been claimed for this method, which brings all the pelvic organs within the grasp of the examiner; but it has proved to be dangerous, and, owing to the fact that pressure benumbs the hand, it is more difficult than it appears to be theoretically. It should not be practiced, except in rare cases in which it is of vital importance to make an accurate diagnosis that can not otherwise be made. Dilatation of the urethra sufficient to admit the finger has

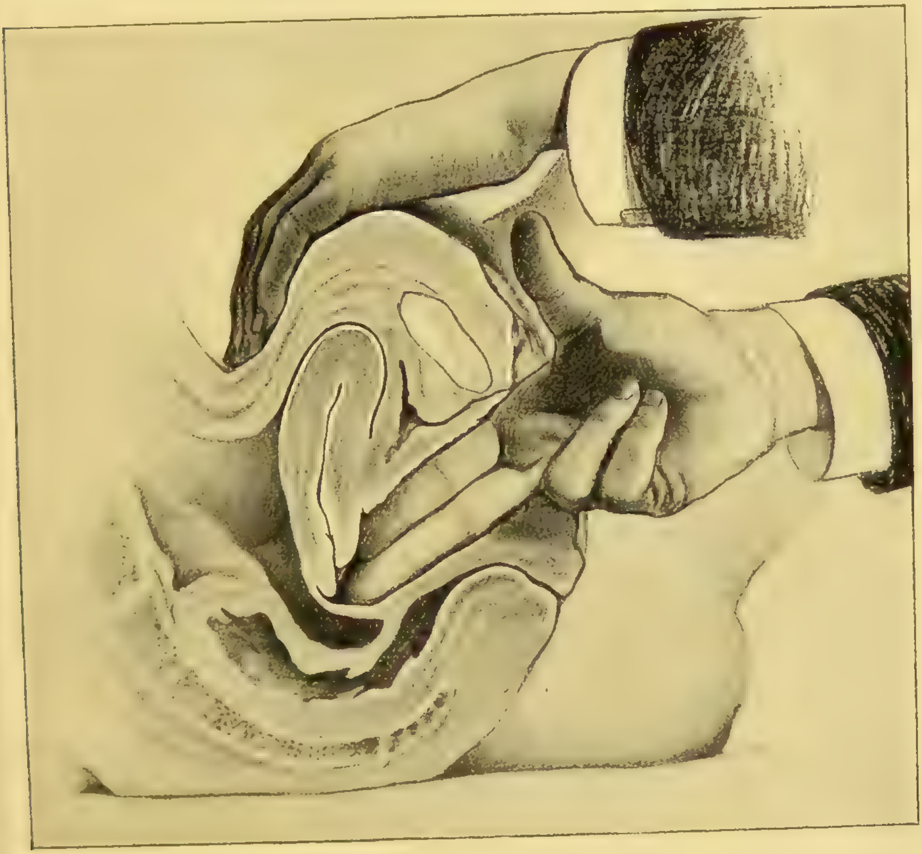


FIG. 2.—Bimanual examination.

been practiced and advised for the purpose of aiding in the exploration of the pelvic organs, but the information gained in this way does not compensate for the suffering and danger; hence the practice is rarely called for, and still more rarely admissible.

Digital Touch by the Rectum.—This method is generally resorted to when some obscure, abnormal condition has been discovered by the vaginal touch. Much satisfactory information can be obtained in this way, especially regarding the posterior wall of the uterus, the ovaries, and the sac of Douglas.

The bimanual method of practicing the rectal touch is the same as the vaginal. Pressure upon the hypogastrium with the external hand gives the conjoined aid, as in examining by the vagina.

Vesico-Vaginal Examination.—In this method a sound is passed into the bladder while the finger is in the vagina. By this means certain states of the vagina, urethra, and bladder are investigated.

Vesico-Rectal Examination.—This is the same as the vesico-vaginal except that the finger is introduced into the rectum. It is the more valuable of the two in exploring all that lies between the bladder and rectum.

Palpation.—Whenever the touch discovers anything abnormal, as a tumor, an enlargement of the uterus, or products of inflammation, additional information can be obtained by abdominal palpation. This is accomplished by manipulating the abdomen so as to outline the part in question, and to test its sensitiveness, mobility, and density. Both hands are usually employed in this examination.

Percussion.—It is unnecessary to describe the manner of practicing percussion. Suffice it to say that percussion is practiced in exactly the same way in exploring the abdomen as it is in exploring the thorax, the object being to test the density of the abnormal part and outline its relations to the abdominal organs.

Palpation and Percussion Conjoined.—This consists in resting the fingers of one hand at one point on the abdominal walls and making percussion at another point. Its chief object is to ascertain if there is fluid present; this is shown by fluctuation. There are three ways of accomplishing this: The first is to select points on the distended abdomen directly opposite one another, resting the fingers lightly at one part, and percussing at the other. This is known as the diametrical method. The second, the peripheral method, is to take points on a section of the abdomen and manipulate in the same way. The third consists in resting the fingers at one point and making pressure at the other, to see if the part is wholly movable or partially so. This differs from the others essentially in substituting interrupted pressure for percussion.

The Speculum.—This instrument is twofold in its use. It is one of the most important aids in the investigation of disease, and at the same time a necessary instrument in treatment. A great variety of specula are used, but two answer all requirements. Sims's speculum and Cusco's bivalve, slightly modified, answer every indication. In fact, Sims's speculum is all that is needed, except when an assistant or nurse can not be obtained to hold the speculum, then Cusco's may be employed with advantage in examining the cervix uteri, and for the purpose of making applications thereto.

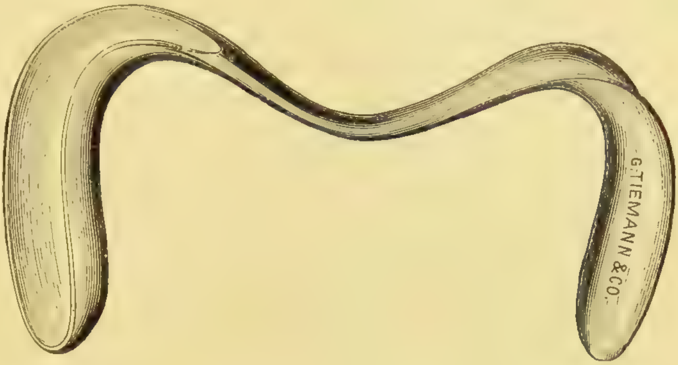


Fig. 3.—Sims's speculum.

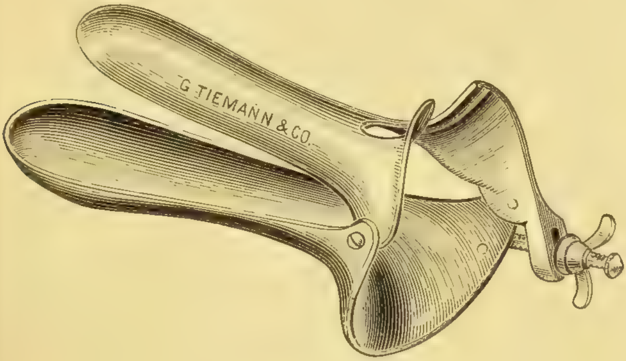


Fig. 4.—Cusco's bivalve speculum.

In using Sims's speculum it is necessary to have the patient upon the table already described, which should be near a window giving a good light. Occasionally it may be necessary to examine a patient upon the bed, but this is difficult, and should not be undertaken until the examiner has acquired by practice great facility in the use of the speculum, and only then, when it is impracticable to place the patient upon the table. A housewife's cutting board placed beneath the mattress will greatly aid in the examination.

The position of the patient should be on the left side, semi-prone, with the left arm behind the back, the head upon a low pillow, and near the right-hand side of the table, the limbs drawn up, the right limb above and in front of the left, and the pelvis at the end of the table on the left-hand side. Fig. 5 illustrates this position.

In order to place the patient in this position, she should stand upon an ottoman or low chair, with her left side toward the end of the table. The skirts on the left side are then raised, and she is directed to sit down on the table; her left hand is placed behind the back, and she is made to lie down on the left side, inclining forward. The

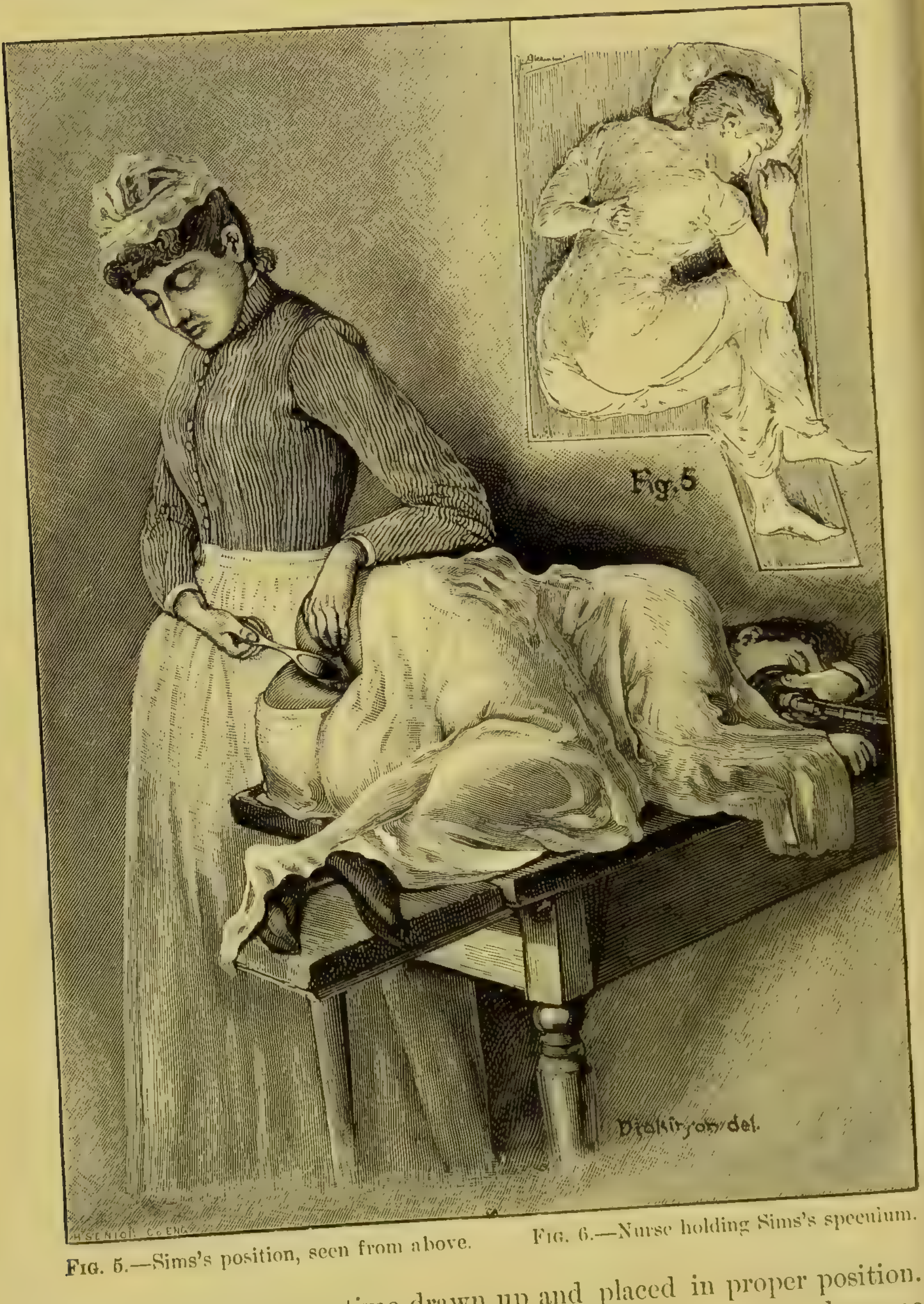


FIG. 5.—Sims's position, seen from above. FIG. 6.—Nurse holding Sims's speculum.

limbs are at the same time drawn up and placed in proper position. The skirts are then pushed up on the right side, and at the same time a sheet is drawn over the limbs and arranged so as to expose the labia only.

The speculum is introduced by separating the labia with the fingers of the left hand, holding the instrument in the right hand by the handle; the point of the blade is placed upon the posterior commissure, and, while backward pressure is made, the speculum is passed into the vagina. Care should be taken not to touch the meatus urinarius. The free blade is then grasped with the right hand by the nurse or assistant, while with the left she raises and supports the natis and labium on the upper or right side. The position of the one who holds the speculum should be with the left side toward the patient, the fingers of the right hand surrounding the blade, while the thumb rests in the inside of the blade. The elbow should rest against the side, as a point of purchase to give ability to make steady traction. The left arm should rest upon the right hip of the patient, while the hand supports the labium and natis to keep them out of the way (Fig. 6). Careful training is required to enable one to hold the speculum properly. The chief and essential requirement is to maintain the instrument for any desired length of time in the position in which the operator may choose to place it. The objects to be attained by the use of the speculum are, to distend the vulva by making traction upon the posterior commissure, and at the same time to draw the whole floor of the pelvis or perinæum backward toward the sacrum, away from the pelvic organs above, which, from the position of the patient, gravitate toward the abdominal cavity. By these means the vagina is distended by atmospheric pressure, which gives space for the admission of light, and room for inspection or manipulation in operating. These facilities can be extended by changing the position of the speculum in the following manner: The assistant who holds the instrument can, by rotating the hand, cause the point of the blade in the vagina to describe the arc of a circle (Fig. 7). By moving the hand forward, the blade is made to point backward

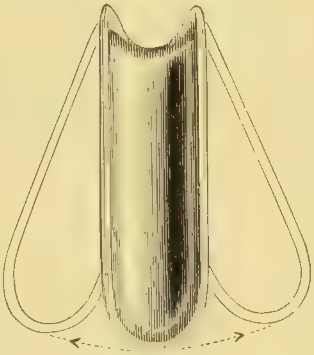


FIG. 7.—The movements of the speculum. First movement.

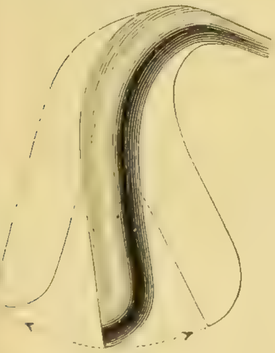


FIG. 8. Second movement.

toward the rectum; and by moving the hand backward, the blade is caused to point forward (Fig. 8); and, finally, by raising or lowering the hand, the speculum is made to reflect the light upward or downward to either the upper or lower side of the vagina, according to the requirements of the examiner (Fig. 9).

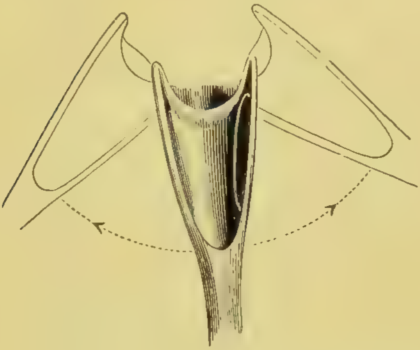


FIG. 9.—The third movement.

At the same time that all these changes of position are being made, the required traction upon the perinæum can be maintained.

In using the Cusco speculum, the position of the patient is the same as for examination by the touch. The labia are separated with the left hand, and the instrument introduced with the blades closed, the direction of introduction being downward and inward. When the speculum is in position the blades are separated. There is quite often difficulty in bringing the cervix into view through this instrument. This can usually be avoided by getting the point of the posterior blade well under the cervix before separating the blades. This speculum is principally used in the treatment of the simpler diseases of the cervix uteri, when an assistant can not be procured to hold a Sims's speculum. As a means of investigation it is quite limited in its use.

Hunter's Depressor.—This instrument is used to depress the anterior vaginal wall. It acts like the anterior blade of a bivalve speculum, and is a necessary companion to Sims's speculum. Of all the depressors, Hunter's I regard as the best.

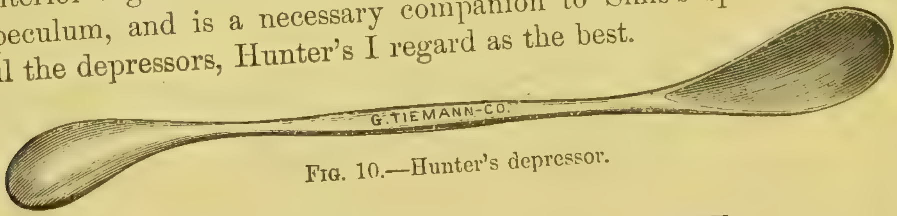


FIG. 10.—Hunter's depressor.

THE UTERINE SOUND AND PROBE.

There are three kinds of sounds: Simpson's, which is made of hard metal, and maintains an unchangeable shape; Sims's, which is of soft metal, and can be bent or molded to any curve; and a third, which is elastic and bends on the slightest pressure, but by its elasticity regains its original shape. There are two varieties of the latter: that made of elastic material like whalebone or rubber, and a metallic one, rendered elastic by a spiral arrangement in its mechanism, known as Jenks's. Simpson's sound is seldom used now, except in a modified form. It is difficult to use, because its shape can not be adapted to different cases; and it is dangerous, from the fact that it will not bend to light pressure.

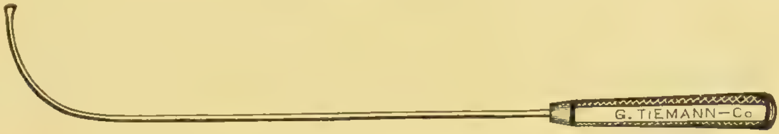


Fig. 11.—Sims's probe.

Sims's probe is made of soft copper or pure silver, both of which metals have the quality of being easily molded. It is like the ordinary probe used in general surgery, only longer and a little thicker, and is provided with a handle (Fig. 11).

The probe which is most generally used, and the one which I prefer for ordinary use, is the same as Sims's, only thicker. It is stiff enough to sustain all requisite pressure, and yet can be easily molded to any curve. In practice it is well to be provided with this one as well as that of Sims.

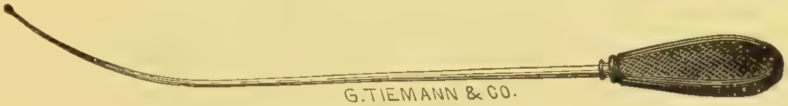


Fig. 12.—Whalebone sound.

The elastic probe is the same in form as Sims's, but is made of rubber, gum-elastic, or whalebone (Fig. 12).

The sound of E. W. Jenks is hollow and spiral for a distance of two thirds from the pointed end. This spiral arrangement gives it flexibility. It is also graduated and provided with a sliding sheath which is very convenient in measuring the depth of the uterus, the arrangement being such that the examiner can run the sheath toward or away from him, the figures at the end of the sheath nearest the handle giving the measurement of the distance from the point to the distal end of the sheath (Fig. 13).

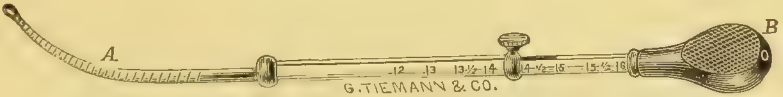


Fig. 13.—Jenks's sound.

The sound or probe should only be used after the position of the uterus has been ascertained by a digital examination, and its sensitiveness tested as far as that can be by the touch. It is very important to know the position of the uterus and its relations to the other organs, in order that the sound may be curved to suit the direction of the canal of the uterus, and to suggest the direction in which the instrument should be guided. There are two ways of probing the uterus: In the one, the patient is placed upon the back, and the finger of the examiner is carried up to the os uteri; the sound is then guided along the finger until it enters the canal, when it is passed to the fundus, the handle being depressed to make the sound correspond to the direction of the canal of the uterus. The other way is to expose the uterus with Sims's speculum, and to pass the sound with the aid of the eye. This latter method is the easier and safer, and gives at least as much information as the one first described. The vaginal walls being distended by the speculum, the instrument is free to accommodate itself to the direction of the canal of the uterus, and, aided by sight, the os uteri can be found at once. Safety in using the sound does not depend so much upon the touch which guides the instrument to the uterus as upon the hand that holds and passes it into that organ. There are few who acquire the perfection of touch to guide the sound into the unseen uterus without using force, which, though very slight, may cause mischief.

In sounding or probing the uterus in any way, force should not be used. This rule should never be violated.

The Sound and Palpation Combined.—In this method of examination the sound is passed by touch, with the patient upon the back, and, while it is in the uterus, it is held with one hand; the other hand is placed upon the abdomen, and downward pressure made until the uterus is felt. The uterus is then moved by the sound, and the movements are detected by the hand upon the abdomen. The information obtained in this way will be noted farther on.

The Curette.—This instrument is used to explore the cavity of the uterus in order to detect any abnormal growths which may be there, and also to remove portions of such growth for inspection, in order to determine their character. The instrument best adapted to this purpose is made upon the principle of the Récamier curette. It is simply a scoop of small size with a stem of flexible copper or silver, the object of this flexibility being to enable the investigator to bend or curve it to suit the position of the uterine canal, and also that it may bend before doing any damage to the endometrium if undue force is inadvertently used (Fig. 14).

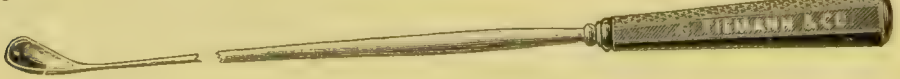


FIG. 14.—Skene's curette.

The curette is introduced through a Sims's speculum in the same manner as the sound, and when once within the cavity of the uterus it is passed over the surfaces of the endometrium, and if any projections are detected a portion can be scraped off and removed for inspection. The further use of the curette will be again described, in connection with the treatment of diseases of the uterus.

The Aspirator.—This instrument is employed to investigate the contents or composition of tumors formed in the pelvis. When the question arises whether the tumor present is solid or fluid, and if fluid what the character of the fluid is, the use of the aspirator will determine. The aspirator used in general surgery answers well; still, a hypodermic syringe, larger than the usual size, and armed with a long, slightly curved needle, thick enough at the end nearest the syringe to give it strength to bear pressure, is more convenient.

The method of using the exploring aspirator is as follows: The patient is placed upon the back, and the point of the needle is guided to the part to be examined, and is then thrust into the mass or tumor; the piston is then drawn out, and the fluid, if any be present, is examined.

Uterine Dilators.—When it is necessary, as occasionally happens, to dilate the cervical canal in order to explore the cavity of the uterus, resort must be had to some of the dilators. These are of two kinds: The first consists of graduated dilators, which can be passed in rapid succession, such as the dilators of Hanks (Fig. 15), and the instruments with expanding blades (Fig. 16). These are intended to produce rapid divulsion to the required extent. The other kind acts by the swelling of the material of which they are made. Of these tents the compressed sponge (Fig. 17), sea-tangle, and tupelo (Fig. 18) are in general use.

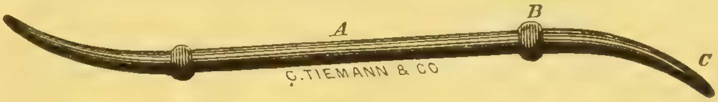


FIG. 15.—Hanks's dilator.

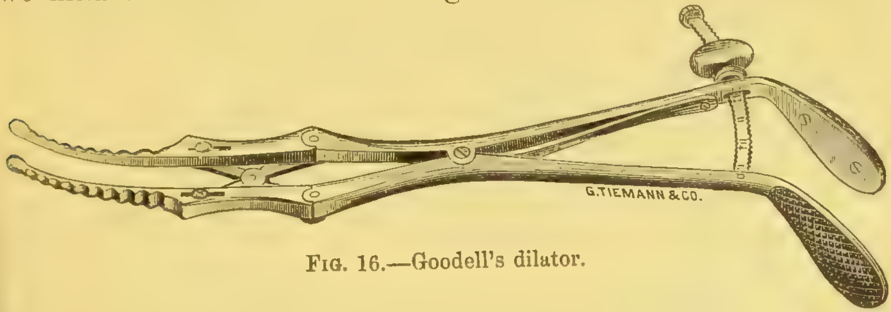


FIG. 16.—Goodell's dilator.

It is seldom that tents are required for purposes of examination only; the dilators mentioned answer, as a rule. They act more promptly, and are less likely to cause after-trouble if dilatation is not carried to an extent which is seldom necessary for purposes of examination. Tents are to be avoided if possible, because of the suffering they cause, and the danger of inflammation and blood-poisoning, both of which misfortunes have followed their use. They expand slowly, and cause irritation and pain, which must be endured for hours before they accomplish their work. Acting thus like foreign bodies and powerful irritants, they are not without danger. The dilators act more promptly, and are less likely to induce inflammation, and, although they cause pain and irritation, these are of short duration.

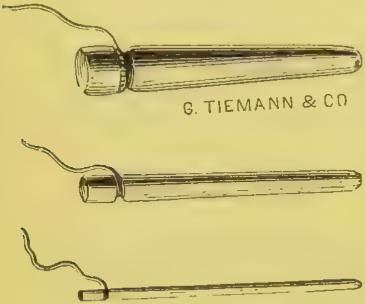


Fig. 17.—Sponge tents.

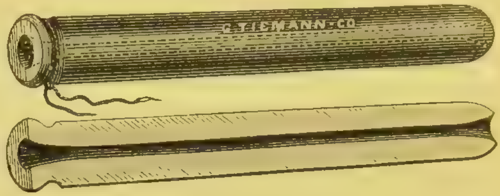


Fig. 18.—Tupelo tents.

The Concave Mirror.—This is commonly known as the head-mirror, and is used in the practice of laryngoscopy. It is also of much use in speculum examinations when a good light can not be obtained. In emergencies occurring at night, the mirror enables the surgeon to use artificial light with perfect satisfaction. Placing a lamp by the side of the patient in front of the examiner, the light can be reflected into the vagina so as to expose the parts in a very perfect way. Facility in the use of this mirror should be acquired, as it is at times indispensable.

The Microscope.—A careful scrutiny of the minute structure of pathological specimens is always necessary to complete diagnosis, hence the microscope should be placed high in the list of means for exact observation and investigation. All that need be done in this connection is to remind the reader of the fact. A knowledge of the microscope and its use must be obtained elsewhere. The progress in microscopic investigation has been so great that many men in active practice have neither the time nor the ability to make their own microscopic investigations. When such is the case, the duty of the gynecologist clearly is to seek the aid of the microscopist that he may obtain through him the required information.

Anæsthesia.—When the parts to be touched in examination are very tender great advantage is gained by the use of cocaine. A two-and-a-half-per-cent solution is safe, and can be made efficient by repeated or prolonged application to the vulva with the McKesson and Robbins glass pyrozone atomizer, and to the cervix uteri with a pipette. When there is great tenderness of the pelvic organs, and the abdominal muscles are in a condition of spasm, which render the examination wholly impossible or sufficiently unsatisfactory to leave a doubt in the mind, then ether should be given to the extent of complete anæsthesia. The relaxation which this affords simplifies all investigations in a very marked degree. In the investigation of the pelvic organs of insane women and in virgins who certainly require examination yet can not submit, the nitrous-oxide gas is of great value. It acts quickly and pleasantly, and has none of the effects during or after its administration which are so distressing to those of sound mind and horrifying to the insane.

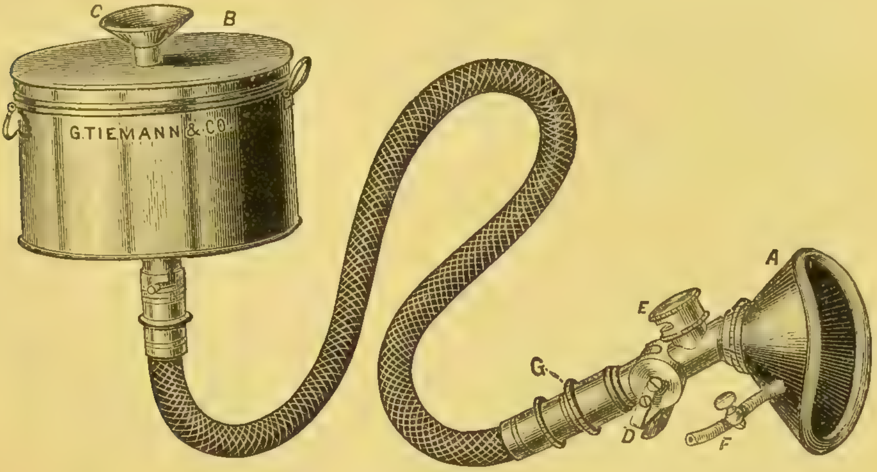


FIG. 18a.—Ether-inhaler. Its principle is the same as that of the nitrous-oxide apparatus. The reservoir, B, in which the ether is vaporized, is separated from the mouth-piece, A, by the long rubber tube. The valves, E, of the mouth-piece permit the expired air to escape without coming in contact with the ether-vapor. The valve, D, enables the anæsthetizer to administer pure air or pure ether, or any proportion of air and ether. F is the rubber tube and stop-cock by means of which the mouth-piece is blown up. C is a funnel through which the ether is passed. G is the joint uniting tube and inhaler. The advantages of the apparatus are that the ether-vapor is warmed, that reinspiration of expired air is avoided, and that the ether may be diluted with air to maintain the required anæsthesia. The stage of violent excitement caused by partial suffocation is avoided, and prolonged anæsthesia can be maintained without the slightest imperfection of aëration of the blood.

The mode of administering it is with the apparatus used by dental surgeons, to whom we are indebted for perfecting the apparatus for giving this anæsthetic. The gas is condensed in a strong cylinder which holds one hundred gallons. By a valve arrangement it is permitted to escape into a rubber bag, from which it is inhaled. The inhaler is an ingenious arrangement by which the act of inspiration opens a valve that permits the gas to be drawn from the bag, while the act of expiration closes the valve in the supply-tube, and opens another valve for the escape of the impure air. There is still another valve under the control of the operator, which admits air with the gas, so that when the patient is fully anæsthetized the gas can be diluted with air in sufficient quantity to keep up the anæsthesia. The cylinder of condensed gas and the inhaler are put up in a case convenient to carry. I have long employed a modification of this apparatus for ether inhalation and I find it superior to the inhalers in general use. Fig. 18a and the accompanying description shows its mechanism and mode of acting.

To be able to recognize the normal and pathological conditions which are revealed by the means described requires much practice. It greatly aids in obtaining that practice—in fact, it is quite necessary—to keep clearly in mind what to look for. In order to facilitate the memorizing of the objects to be investigated, I have arranged the signs under each of the various means of obtaining them as follows:

Vaginal Touch.—Position, size, shape, and density of the uterus.

Size and shape of the os externum.

Presence or absence of discharge from cervix.

Condition of vaginal walls, perineal body, and recto-uterine space.

State of the rectum and lower portion of sac of Douglas.

Position of the bladder and urethra as indicated through the anterior vaginal wall.

Presence or absence of fixation of pelvic organs; swelling or tumors in the sac of Douglas or broad ligaments.

Tenderness at any part.

Bimanual Touch.—Size, form, and position of the body of the uterus.

Tenderness and mobility of the uterus and other organs and tissues.

Position and state of the Fallopian tubes and ovaries.

Condition of the bladder.

Presence of neoplasms and their relation to the pelvic organs.

Products of inflammation, their location and character.

Rectal Touch.—Condition of the rectum, posterior surface of the uterus, broad ligaments, Fallopian tubes and ovaries, and utero-sacral ligaments.

Vesico-rectal Touch.—Absence of the uterus from its normal position in inversion of the uterus, entire absence of the uterus; aid to diagnosis in women who are too fat to permit the bimanual examination.

Vesico-vaginal Touch.—Changes in the position of the bladder and urethra. Results of disease in the vesico-vaginal septum.

Palpation.—Form, size, and density of tumors or products of inflammation felt through the abdominal walls.

Percussion.—Density of morbid parts.

Normal resonance.

Palpation and Percussion Conjoined.—Fluctuation, density, or elasticity of morbid parts.

Speculum.—Appearance of mucous membrane of cervix uteri and vagina.

Signs of inflammation of mucous membrane.

Relations of the cervix to the vagina.

Form of os externum.

Character of secretions.

Signs of injury to the cervix and vagina.

Nature of new growths suggested by their appearance.

Sound and Probe.—Direction of the canal of the cervix and cavity of the body of the uterus, in relation to their normal position in the pelvis.

Relation of the canal of the cervix and cavity of the body to each other.

Straight, deflected, or tortuous state of the cavity of the uterus.

Long and transverse diameters of the cavity of the uterus.

Caliber of the cervical canal, os externum, and os internum.

Degree of sensitiveness or roughening of the different portions of the cavity of the uterus.

Sound and Palpation Combined.—Displaced uterus may be raised up to meet the touch of the hand upon the abdomen for examination.

Mobility of the uterus with or without moving abnormal growths in the pelvis or lower portion of the abdomen.

Curette.—Presence or absence of growths or tumors in the uterus.

Removal of portions of growths from the cavity of the uterus for inspection.

Aspiration.—Abstraction of fluid (encysted or otherwise) for inspection.

Dilators, tents, anæsthetics and head-mirror as aids with other means of exploration.

CHAPTER II.

DEVELOPMENT OF THE FALLOPIAN TUBES, UTERUS, AND VAGINA.

The Fallopian tubes, uterus, and vagina are developed from two primary elements known as Müller's filaments. These filaments when first visible in the embryo are solid, and are situated on either side of the vertebral column, a little in front of and on the inner side of two other primary elements, the Wolffian bodies. The changes which take place in Müller's filaments during the evolutions of development are as follows: From solid fibers, slightly enlarged and club-shaped at their upper ends, cavities are formed, and these become canals. Their lower ends approximate and coalesce, from below upward, less than half their length. This change, which takes place between the ends of the sixth and eighth weeks of fœtal life, is represented in Figs. 19 and 20. At this stage of development, Müller's ducts are separated by a septum formed from their coalescent walls, so that the united portion shows a right and left cavity. These two cavities are soon converted into one, the septum disappearing from below upward throughout the whole of the united portion of the ducts. The lower single canal thus formed is the rudimentary vagina and uterus, while the two upper ends of Müller's ducts form the Fallopian tubes (Fig. 21). From this time to the fifth month there

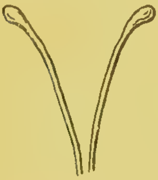


Fig. 19.—Muller's ducts.

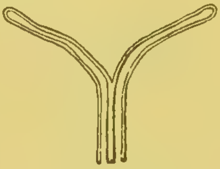


Fig. 20.—Coalescence of ducts.

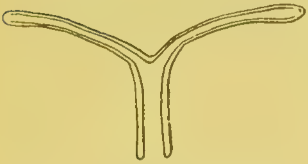


Fig. 21.—Disappearance of septum.

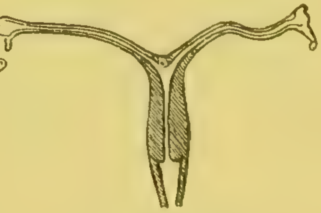


Fig. 22. — Appearance of fundus and cervix.

is an increase of tissue, especially in the upper portion of the canal, which renders the distinction between the vagina and uterus apparent. The upper ends of Müller's ducts expand and become slightly fimbriated at their extremities. The upper portion of the uterus at this time is bifurcated and forms the two horns between which the fundus is subsequently developed. Fig. 22 shows the organs at this stage of development. In the sixth and seventh months the uterus increases in size, especially in the cervical portion, which at this stage is much larger than the body. There is also an increase of tissue between the horns of the uterus which renders their divergence less marked. The rugose arrangement (palma plicata) of the rudimentary mucous membrane of the cavity of the uterus extends very nearly to the fundus, its folds running outward to the uterine orifices of the Fallopian tubes. Elevations appear in rows upon the mucous membrane of the vagina which are the rudiments from which the transverse folds are subsequently developed. During the eighth and ninth months the thickness of the walls of the body of the uterus increases, the fundus becomes more prominent and rounded, but up to the time of birth the cervix is larger than the body of the uterus. At the time of birth the primary development of the uterus is complete, and it changes very little in form from that time until the period of puberty. The size and appearance of the infantile uterus are shown in Fig. 23. The cavity of the uterus and the arrangement of its mucous membrane are represented by Fig. 24. Fig. 25 gives a side-view of the uterus and vagina, and shows their relations to each other. At this time the cervix projects but little into the vagina.

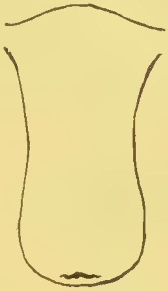


FIG. 23.—Infantile uterus.

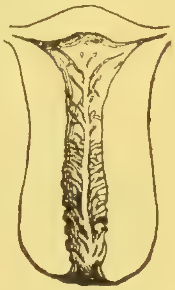


FIG. 24. — Palma plicata extending nearly to fundus.

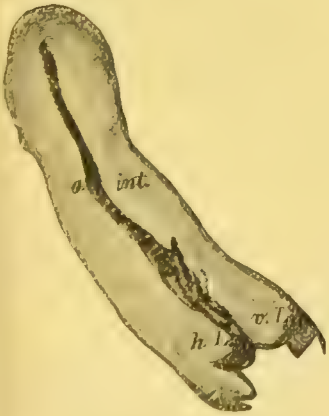


FIG. 25.—Infantile uterus, antero-posterior section, scant invagination.

From the time of birth, when primary development is complete, up to the period of puberty, the uterus undergoes very little change except during the second dentition. At that time the body increases in size, becoming more nearly equal to the cervix. The palma plicata disappears from the body of the uterus, excepting one longitudinal fold. The uterus gradually descends into the pelvic cavity and the cervix is projected down into the vagina a little farther. From this time no changes occur worthy of notice until puberty, when secondary development takes place.

Secondary development consists in a general increase in the size of the uterus, especially in the body and fundus, which become much larger than the cervix. The length of the uterus is increased. The walls become thicker and firmer. The last trace of the palma plicata disappears from the mucous membrane of the cavity of the body, and the mucous membrane becomes thicker by the formation of its glandular tissues. In this way the uterus attains the shape and size of maturity. Together with the changes in size and form comes a change of position. The uterus descends into the pelvis and complete invagination of the cervix occurs.

Fig. 26 shows the general appearance of the mature uterus in outline, and Figs. 27 and 28 represent the relations in which the cervix and vagina stand to each other. By comparing Figs. 23 and 25, which illustrate the infantile uterus, with Figs. 26 and 27, the difference between the results of primary and secondary development will be fully comprehended.

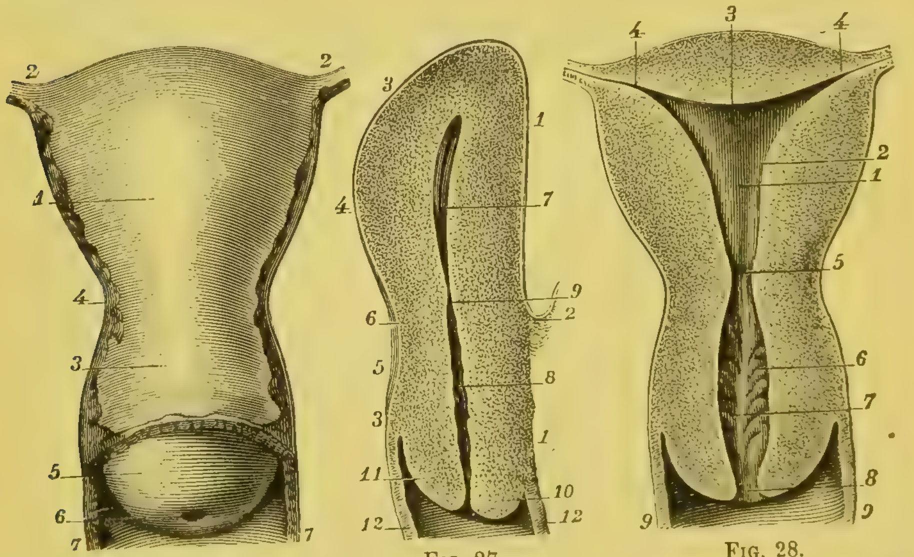


FIG. 26. FIG. 27. FIG. 28.

FIGS. 26–28.—Virgin uterus (Sappey): 26, anterior view; 27, median section; 28, transverse section. 26. 1, body; 2, 2, angles; 3, cervix; 4, site of the os internum; 5, vaginal portion of the cervix; 6, external os. 27. 1, 1, anterior surface; 2, vesico-uterine *cul-de-sac;* 3, 3, posterior surface; 6, isthmus; 7, cavity of body; 8, cavity of the cervix; 9, os internum; 10, anterior lip of os externum; 11, posterior lip. 28. 1, cavity of body; 4, 4, cornua; 5, os internum; 6, cavity of cervix; 7, arbor vitæ of the cervix; 8, os externum.

MALFORMATIONS OF THE UTERUS.

The malformations of the uterus are naturally divisible into two classes: those that occur during embryonic life, and those that occur at puberty, the period when secondary development takes place. The first class embraces the greatest variety. Nearly all of these malformations are due to arrest of development at different stages of that process. The malformations most frequently seen are the uterus bipartis, uterus duplex, uterus unicornis, uterus bicornis, uterus bifundalis unicollis, and rudimentary uterus, generally known as absence of the uterus. A very rare condition has been described as hypertrophy of the uterus, and classed with the malformations. It is really not a malformation, but a complete development of the

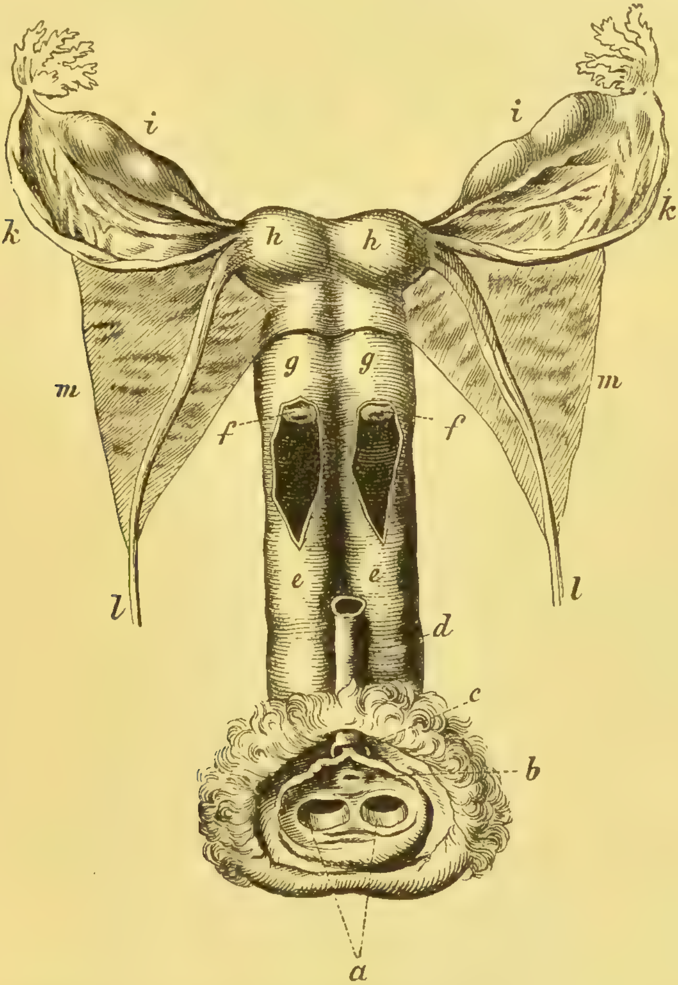


Fig. 29.—Double uterus and vagina from a girl aged nineteen (Eisenmann): *a*, double vaginal orifice with double hymen.

uterus during infantile life. When the first evolution in the process of development—i. e., the union or coalescence of Müller's ducts—

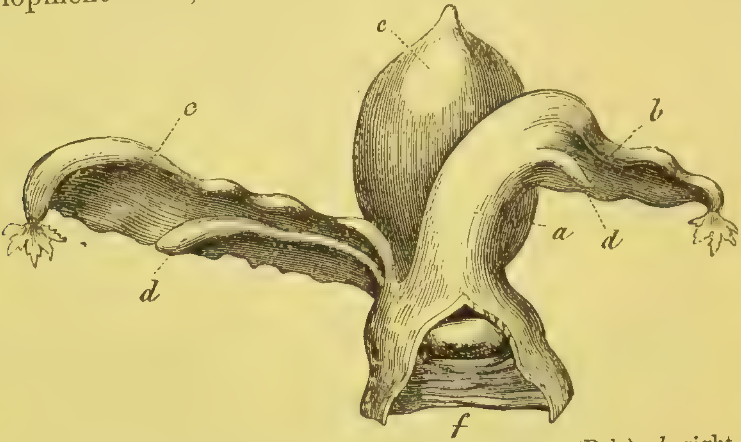


FIG. 30.—Uterus unicornis from a young child, posterior aspect (Pole): *b*, right Fallopian tube; *c*, left Fallopian tube exceptionally present; *d d*, ovaries; *e*, bladder (Courty).

is arrested, and each duct grows by itself, the result is the uterus bipartis.

The uterus duplex is formed by the coalescence of the ducts, with arrest of absorption of the central wall. The development goes on, so that in time the whole organ is larger than the normal uterus, but it is divided into two by the central wall (Fig. 33). Uterus unicornis is produced by a complete arrest of development of one of the ducts at the part which should form one half of the body and fundus of the uterus (Fig. 30). The uterus bicornis occurs as the result of non-union of that part of the ducts which forms the

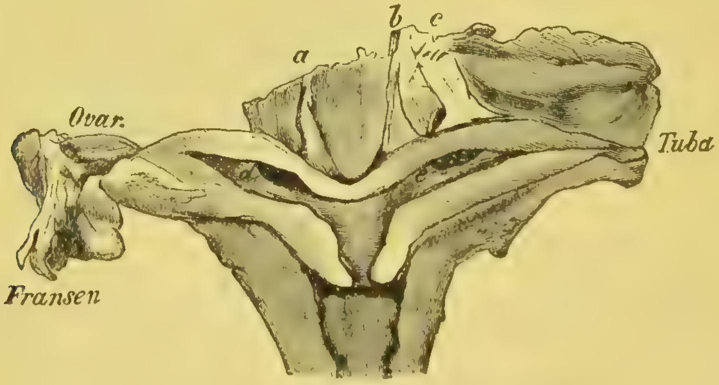


FIG. 31.—Uterus bicornis unicollis (Winckel).

body and fundus (Fig. 31). The uterus bifundalis unicollis is formed by the same error of development as that which produces the uterus bicornis and double uterus with the following difference: In the uterus bifundalis (Fig. 32) the horns, though not united, are well developed and present outlines more nearly like the normal body of the uterus, while the part which forms the cervix is completely developed. Entire absence of the uterus is perhaps unknown, unless in monstrosities in whom the lower part of the trunk is wanting. Rudimentary uterus is seen occasionally. As most frequently found, it presents a very small cervix slightly, if at all, invaginated, and in place of the body of the uterus one or two small solid masses are found from a quarter to half an inch in thickness and about the same in length.

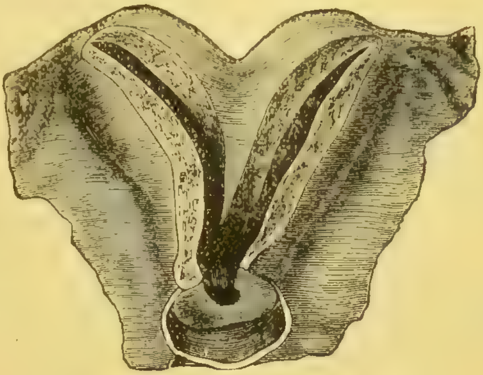


FIG. 32.—Uterus bifundalis unicollis.

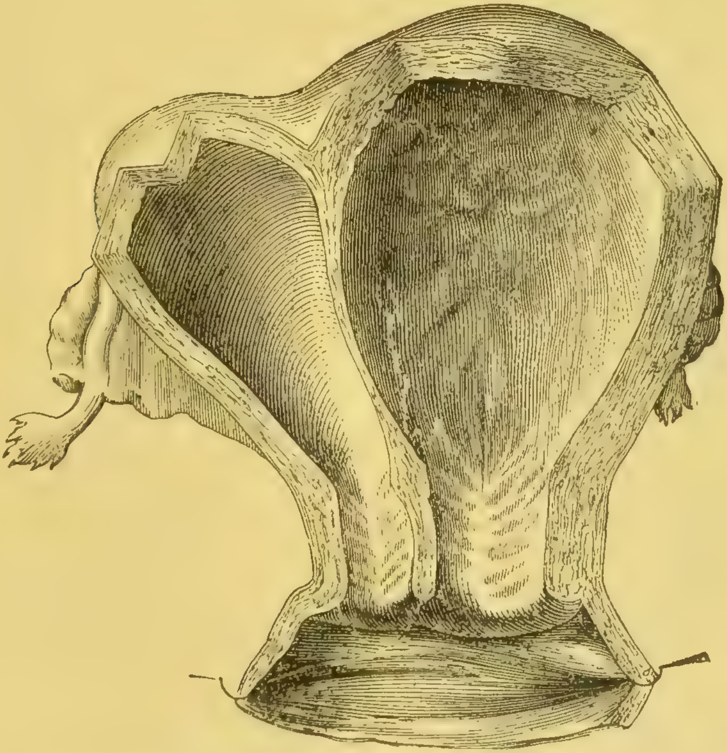


FIG. 33.—Uterus duplex (Cruveilhier). Left walls developed in consequence of pregnancy.

The effect of malformations as manifested during functional life is quite remarkable. In some there is not the slightest deviation from health in the function of the sexual organs. In others the results are very disastrous. This practically gives two classes of malformations according to the effect they have upon the health and usefulness of the subject. In the one class the malformation does not materially affect the function of the uterus, while in the other the functional action is always imperfect—sometimes impossible. The cases of simple deformity, in which there are sufficient development and growth of one or both elements of the uterus to make the organ functionally competent, have no ill effect upon the general usefulness and welfare of the individual. The following case will illustrate this:

Double Uterus and Vagina.—A married lady, thirty-two years of age, who had borne three children and nursed them, called upon me for advice regarding a leucorrhœa which had troubled her since the birth of her last child. Her general health had always been excellent. Upon making a digital examination, I found the vagina normal and also the cervix, excepting that one side of the cervix was closely united to the vaginal wall throughout its entire length. On the left side of the vagina high up I found a hard mass which was also noticed on making bimanual exploration. The first impression was that she had suffered from a pelvic cellulitis, and that the mass on the left side was the remains of its products. This idea was given up at once on finding that the patient gave no history of any pelvic inflammation. I then suspected that there might be a fibroid in the left side of the uterus, which, by extending the entire length of the cervix, had pushed the vaginal wall before it. A speculum examination revealed a catarrh of the cervical canal. The uterus had the usual appearance of one that had borne children, and the cervix was normal in shape and position, except for the peculiar relations of the cervix and vagina on the left side, which were noticed during the examination with the touch. Just within the labium minus on the left side, a peculiar fold of the vaginal wall was noticed running transversely. On raising this fold with the point of the sound it was found to be a septum, and there was also discovered another vagina to the left of it. Using a smaller Sims's speculum to distend this vagina, I found the other cervix which had all the characteristics pertaining to a nullipara. The passage of a sound showed that the canal of the uterus on the left side was not quite so long as the one on the right. It was then clearly evident that the patient had a double uterus and vagina, and that the right uterus had borne three children, while the left uterus was a virgin one. She was attended in her confinements by three different physicians, none of whom made any reference to this malformation, and it is fair to suppose that none of them discovered it.

This case is of interest as showing the fact that some of the malformations do not in any way affect the function of the uterus nor the general health of the subject.

When there is malformation, and the growth of the uterus falls so far short of the normal type that functional activity is impossible, the results are often very unfortunate. The nature of this class of cases bears such close resemblance to those in which there is arrest of secondary development at puberty, that they may be considered together in the following chapter.

A Unique Case of Double Uterus.—In this case I found a large uterus with a well-formed cervix, and directly in front of it a very much smaller uterus, the cervix of which was but slightly invaginated (Fig. 34).

On my first examination I made a diagnosis of uterine fibroma. I thought that I could outline the tumor projecting from the uterine wall toward the bladder. Subsequently I noticed a free discharge of uterine leucorrhœa issuing from a slight elevation on the vaginal wall in the median line, about an inch from the os externum of the larger uterus. I passed a sound through the small opening in the wall of the vagina, and found that it entered about an inch and three quarters, demonstrating that the supposed fibroid was a small uterus.

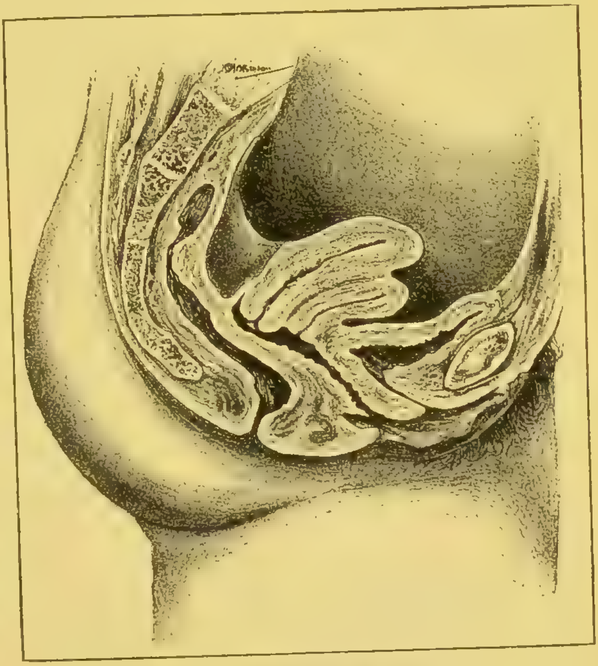


FIG. 34.—Double uterus.

I account for this strange malformation on the theory that, during development and after coalescence of Müller's ducts, these rudiments made half a revolution, thus bringing one in front of the other.

CHAPTER III.

MENSTRUATION AND ITS DERANGEMENTS, AND CHLOROSIS.

Menstruation is the function of the uterus that especially claims the attention of the gynecologist, though it is only a subordinate part of the great process of reproduction. Professor Stevenson, of the University of Aberdeen, describes the physiology of menstruation as a nutritive and active innervation wave that periodically runs to the pelvic organs, attaining its height at the beginning of utero-gestation, or, in the absence of gestation, at the beginning of menstruation. This nutritive material is eliminated when the mucous membrane of the cavity of the body of the uterus undergoes degeneration, either wholly or in part, and is exfoliated in a granular state. This degeneration and exfoliation, according to some observers, involve the whole membrane down to the muscular walls, while others claim that they affect only the epithelial layer. Be this as it may, there appears to be a general agreement among the authorities of the present time that degeneration and exfoliation occur to an extent sufficient to expose the smaller blood-vessels of the endometrium, and to so weaken their walls that they give way and hæmorrhage follows.

This menstrual flow is composed of blood from the vessels, with at least the *débris* of the degenerated and exfoliated epithelium. The flow, which lasts for days, subsides, the mucous membrane is renewed, and the same high state of anatomical completeness and functional capability is restored, when another menstruation takes place, and so this function is repeated over and over again, except when suspended during pregnancy or lactation, until the end of functional activity at forty-five years of age or thereabout.

During the period of functional activity of the sexual organs, from puberty to the menopause, menstruation is an evidence of health, and is also essential to health. It is an index of the state of the sexual system and also of the general health of mature women.

Hence its derangements constitute most valuable evidence of the presence of disease, while its normal recurrence is an evidence of health. In practice it is best to study this function by its characteristics, rather than by theories regarding its cause or the reasons for its existence. It is on this account necessary to comprehend its natural history; therefore, I propose to give here a synopsis of the conditions of menstruation.

The laws which govern this function of menstruation, as given in our text-books, are so varied by climate, personal peculiarities, and the conditions of life, that a general average pertaining to these laws is about all that can be obtained, and this can be used to very little advantage in practice. Fortunately, there are certain rules which apply to menstruation with great uniformity, and these should be clearly understood. The most important of these are the following:

1. Menstruation should begin at puberty—i. e., when the woman is maturely developed, no matter what the age may be. Increase of size may take place by growth after puberty, but all the organs of the body should be completely developed, so far as form and structure are concerned, before the function of menstruation is taken up.

2. It should recur at regular intervals; about every twenty-eight days is the average time. A regular periodicity is normal, but the duration of the periods often differs in different persons.

3. The discharge should always be fluid in consistence and sanguineous in color.

4. The flow should continue a definite length of time, the duration depending upon the habit of each case; at least there should not be any great deviation from this rule.

5. The quantity should be about the same each time.

There should be no deviation from the first rule. If the menses appear before development is complete, both in the sexual organs and the general system, it is an error which is either the result of disease or of the surroundings of the patient, and generally modifies unfavorably her future life unless it can be corrected. The same may be said regarding those who fail to menstruate when the development and growth of the body are completed. The other rules regarding the recurrence, duration, quantity, and character of the menstrual flow, may vary in different women, but they should be uniform and regular in each person. Whatever the habit may be that is established at puberty in a given case, that habit should be maintained through life. Some women menstruate systematically from puberty until after bearing a child, then they take up a different order of menstruation in regard to all or some of the characteristics of that function. That is normal, but it is the only well-marked change in habit which is the same in health.

Obedience to these laws of the menstrual function implies certain conditions that are necessary to the fulfillment of these laws. These may be briefly stated as follows :

1. Maturity of development of all the organs, both of the general and sexual systems, and a fair degree of health of all.

2. A sufficient and well-regulated supply of normal blood to the sexual organs.

3. Normal structure and functional activity of the nerves which preside over the action of the sexual organs.

4. Conditions of life favorable to general health and reproduction. This includes food, climate, society, and occupation.

Allusion has already been made to absence of the uterus and also to its rudimentary states in which the menses never appear, and because of these marked anatomical defects and absence of function nothing can be done by the gynecologist in the way of improvement.

There remain to be considered cases in which the conditions of menstruation are all present but in an imperfect degree, so that menstruation, although established, is performed imperfectly.

ILLUSTRATIVE CASES.

Uterus Unicornis; Imperfect Menstruation and the Results.—A woman, twenty-nine years of age, of healthy parents, above the average size, and well formed generally, had enjoyed excellent health until she was eighteen years of age. About that time her mammary glands became well developed and she presented all the outward characteristics of woman physical and psychical. She then began to suffer at stated periods from backache, a sense of fullness in the pelvis, and slight leucorrhœa. In a day or two after these symptoms came on, and while they continued, she became dull and sleepy, and had a feeling of fullness in the head and slight headache. These attacks lasted several days, when they passed off and again returned about every month. In the interval her health was good and she performed her duties as a domestic. Five months after the first time that these symptoms appeared, and while she was suffering from an attack, she had a slight menstrual flow, which lasted less than twenty-four hours, and appeared to alleviate her suffering. The next month her flow returned in the same way, but all her symptoms were increased. From this time on her menstrual flow returned regularly, but did not increase in duration or quantity. At each recurring menstrual period her suffering increased in severity until she was obliged to give up her duties at such times. On one occasion when she was trying to do her work while suffering, she was exposed to cold and was seized with an inflammation—pelvic peritonitis, no doubt—and was taken to the hospital, where she remained for three months. During that time she took morphine liberally. From this time her suffering during the menstrual period was very great, sufficiently so to keep her in bed, and to require large doses of morphine to make life tolerable. Another attack of pelvic peritonitis came, and again she was sent to the hospital for treatment. She recovered from the acute attack, but her suffering at her periods was far greater than ever before. Epileptiform convulsions came with her pelvic pains, and were repeated frequently until the menstrual period passed by. For several years her time was spent between her home and the hospital, and in occasional efforts to do the duties of a house-servant.

Condition when First Examined.—Having obtained the above history from the patient, I observed that she still had all the evidence of fair general health, except that, from pain and the use of morphine, her nervous system was decidedly impaired.

Physical Signs.—The touch detected a very small cervix uteri which projected into the vagina only half an inch. The organs and tissues were fixed, and on the left side there was an irregular mass which felt like the products of a former pelvic peritonitis. On the right side the parts were less elastic than normal, and, owing to an exceedingly tense state of the abdominal muscles, the body of the uterus could not be felt, neither could the right ovary be positively made out. From the negative signs, however, I was able to satisfy myself that the right ovary was not enlarged, nor was the body of the uterus as large as it ought to be. The speculum revealed nothing of value, but, in using the sound through it, I could pass that instrument into the cavity of the uterus. The canal of the cervix was an inch in length, and in its proper position as indicated by the sound. When the internal os was reached, the sound turned to the right and passed in that direction about an inch. This led me to suspect that the uterus was unicornis. To obtain further evidence, the speculum was removed, while the sound was left in the uterus. The patient was then placed upon the back, and by the rectal and vaginal touch combined, the horn of the uterus above the vagina was reached. While making the combined touch, an assistant rocked the horn of the uterus with the sound, and I could then outline it with the fingers. It was about an inch in its transverse, and only a little more in its long diameter. The upper end, which represented the fundus, appeared to be slightly pointed in place of rounded, as is the fundus of the normal uterus.

Treatment.—There was nothing in the case to give the slightest hope that she would derive benefit from any general treatment. The removal of the ovaries to stop the tendency to menstruation was the only indication apparent to my mind, and, owing to the old adhesions from the former pelvic peritonitis, the dangers of that operation were fully appreciated. The case was explained to the patient and the friends who brought her for my advice, and they were left to choose between the removal of the ovaries, or no further care on my part. The patient, after thinking of the dangers and the prospects, became very anxious for the operation. Her argument was that she was tired of life, and that all her friends were tired of caring for her, and, if there was one chance in a thousand of being relieved, she longed for that chance.

The operation was performed with great difficulty, owing to the adhesions. The right ovary was completely surrounded with inflammatory products, and was found with much trouble. The left ovary was adherent at several points that were easily broken up. There was no trace of the left horn of the uterus, nor of the left Fallopian tube. The right ovary was located within one inch of the upper end of the right horn of the uterus, and there was no well-defined Fallopian tube on that side.

Comments.—This case certainly illustrates fully the great suffering that may arise from this degree of malformation. The presence of well-developed ovaries which excite a demand for menstruation, associated with a uterus incapable of performing that function, is one of the most unfortunate conditions known to the gynecologist. It is evident, also, that the development of the one horn of the uterus sufficient to make a slight effort to menstruate only aggravates the difficulty. This patient would perhaps have been better had the uterus been absent altogether.

Incidentally, I may remark that the absence of the tubes in this case is evidence against those who claim that they have a leading influence in causing menstruation.

Rudimentary Uterus Bicornis; Entire Absence of Menstruation.—When first examined, this lady was thirty years old, below the average size, but well formed, and presented, to outward appearances, all the characteristics of her sex. As a child she was rather small and delicate, but had good health. At the age of sixteen she passed through all the changes of form common to puberty, but never menstruated. When questioned regarding her health at that time, she remembered only that she occasionally had slight headache and indisposition, but whether these symptoms came periodically or not she did not know. At no time was her suffering sufficient to interrupt her school duties. She was married at eighteen, and, while she was affectionate and devoted as a wife, sexually she was perfectly negative. Without being very strong mentally or physically, she enjoyed good health, and only called upon me at the time she did because of some temporary irritation of the urethra which caused pain on urination. This gave me an opportunity to examine her pelvic organs. The external organs were normal, and the vagina also. The cervix uteri was not more than five eighths of an inch in diameter. The os externum was small but normal. In the location of the body of the uterus two small, oblong, bifurcated bodies were found continuous with the cervix. These bodies were about a quarter of an inch thick and about an inch long, as nearly as could be estimated by the bimanual examination. I regarded them as the rudimentary horns of the uterus, which were retroverted. Near the upper ends of the horns of the uterus, and a little outside of them, two other bodies were found which I presumed to be the ovaries. They were about half the size of a fully-developed ovary and of the usual form of that organ, except that they were not so flat from before backward, and appeared to be more dense than normal. It was evident that the development of the ovaries had progressed further than that of the uterus, because they were relatively much larger than the rudiments of the uterus. Owing to the fact that the patient was of small size, with non-resisting abdominal muscles and the rudiments of the uterus retroverted, the examination was easy, so that I feel some confidence in giving the physical signs and the diagnosis based upon them, believing that they are correct.

Comments.—This case apparently shows that the ovaries were sufficiently developed to influence the changes which occur at puberty, but were so much under size that they were incapable of the highest functional activity, while the uterus was not only arrested in its development, but in its growth also; hence menstruation, even in an imperfect way, was impossible. This case is placed in contrast with the preceding one to show that when arrest of development and growth is such as to render functional action entirely impossible, a fair degree of health may still be maintained; while, on the other hand, if the development and growth of the ovaries are complete, and the uterus is developed sufficiently to make an imperfect effort to menstruate, the health and usefulness of such a one is greatly impaired, and a life of suffering generally follows.

Small Uterus from Arrested Growth; Scanty Menstruation improved by Treatment.—The patient was a young woman of full size and well formed, and of a sanguine, nervous temperament, and a remarkably good and well-cultivated mind. She had always enjoyed good health excepting when she was fourteen years old. At that time she was "working hard at school, and became run down." Rest soon restored her, and she began to menstruate at the age of fourteen years and six months. Her menses from that time returned regularly, but the flow was scanty and lasted only forty-eight hours. During the menstrual period, and for several days after it, she suffered from fullness of the head, restless nights, and a feeling of discomfort in the pelvis with general mental and physical indisposition. She continued in this way until she was mature, the time when she was first examined. By the touch the cervix uteri was found to be rather small, but well formed and in proper relations to the vagina. Owing to the rigid state of the abdominal muscles, the uterus could not be satisfactorily outlined by the bimanual touch. Using the sound through the speculum, the long diameter of the uterus was proved to be one and seven eighths inches; quite a small uterus for a woman of her size. Her general health was very good indeed, and she would not have sought immediate advice had it not been that she was engaged to be married, and was very anxious to be relieved from the ill feelings which came in connection with her scanty menstruation.

Treatment.—At her next period she was directed to take a teaspoonful every three hours of the following mixture: Ammon. mur., ʒij; aquæ camph., ℥ij, to begin as soon as she felt that the period was approaching, and to continue until six hours after the flow stopped. Not being used to medicine, she objected to it strongly, and during her subsequent periods she took a teaspoonful of liq. ammon. acetatis every three hours, commencing one day before the flow began and during its continuance. Immediately after the flow ceased, one or more fine punctures were made near the external os, which produced considerable bleeding. This was done to relieve, as far as possible, the congestion which lingered because it was not relieved by the menstrual flow. This was practiced after three periods. At intervals of six days during the entire menstrual flow the canal of the cervix, including the internal os, was gently dilated with graduated sounds. This was done in the hope that it would stimulate the nutrition of the uterus.

After the third month of treatment it was found that the menstrual flow had increased in quantity and continued for one day longer. A stem-pessary was then introduced, but it caused more irritation than was safe; so, after it had been worn for three days, it was removed, and not used again.

From this time onward the treatment was limited to a mild constant electric current. One electrode was passed into the uterus, the other applied alternately over the sacrum and supra-pubic region. This was repeated every six days in the interval between the monthly periods. She continued to take the solution of acetate of ammonia at each period, but with what benefit is not known. At the end of eight months the uterus measured two inches and one eighth in its long diameter, and she menstruated between four and five days at each time, the flow being much more free and her unpleasant symptoms having all disappeared. She married then, and I lost sight of her for seven months, when she called to consult me regarding amenorrhœa, which had existed for two months and was due to pregnancy. I heard that subsequently she was confined, and was in quite good health.

Undersized Uterus from Arrested Growth; Scanty Menstruation; Sterility; Incurable.—This woman was thirty years old when this history was obtained. She was of medium size, and had enjoyed fair health most of her life. During her girlhood she had to work very hard in a store, and often suffered at that time from fatigue. She developed slowly, and did not menstruate until seventeen years of age. During the first four years after puberty the menses lasted only two days and the flow was scanty. At twenty-two she was married, and placed in easier and more comfortable circumstances, and for about one year the menstrual flow lasted from two and a half to three days at each time. She then missed one period, and then the menses returned more freely than ever before, which made her believe she had had a miscarriage; but of this there was no proof. When she had been married two years she began to have pain of a dull, aching character in the region of the uterus during her menses. This pain became more marked as time advanced, and gradually the pain extended to the ovaries. These pains were never acute, and passed away entirely after menstruation ceased. At twenty-nine years of age she had sickness in her family and was overtaxed thereby, and her menses stopped for five months, but again returned. In the absence of the menses she had leucorrhœa, but not before nor since.

Examination by the touch showed the uterus to be relatively long and narrow; the body was not much larger than the cervix. The long diameter as measured with the sound was two inches. There was slight tenderness on pressure over the ovaries. All the pelvic organs were in normal position. Her general health was about as good as it ever had been.

Treatment.—Sodium bromide, gr. xxx, was given three times a day in Vichy water before meals during the menstrual period. This relieved the uterine and ovarian pain very much. Between the periods the hot-water douche was used until all pain had been relieved. The subsequent treatment was about the same as in the case last related, with the addition of more extensive dilatation of the cervical canal, and she also wore the intra-uterine stem-pessary for six weeks. She took internally phosphates, iron, and strychnia in various forms, and for several months.

At the end of seven months she was free from all pain during menstruation, but the flow was no freer, nor did it last any longer. The uterus had not in the least increased in size. She was dismissed unimproved, so far as the growth of the uterus was concerned.

Comments.—This and the preceding case are placed together to show the results of treatment. They demonstrate that the prospects of success in increasing the growth of the uterus depend very largely upon the age of the patient. The earlier in life that the treatment is begun, the more likelihood is there of success.

Undersized Uterus, its Growth apparently being arrested by Premature Sexual Nervous Excitation; Irregular and Painful Menstruation; all the Symptoms increased by Local Treatment.—This was a single woman, twenty-two years old, the daughter of wealthy and educated parents. She was tall, spare, and of nervous temperament. Before puberty she acquired the habit of self-abuse while at school. While her general system was not developed, and while weak, irritable, dyspeptic, and subject to severe headaches she began to give evidences of puberty, and her menses first appeared at twelve years of age. From this time, up to the time of taking this history, she menstruated irregularly, the average time between the periods being five weeks, but often two, three, and on several occasions five months elapsed. The flow was usually normal in quantity, character, and duration, although the latter was variable. Pain in the back, pelvis, and lower portion of the abdomen always accompanied the menses, and was sufficiently severe to keep her in bed during that period. The severity of the pain was presumably not so great as the patient described. Her extreme sensitiveness inclined her to exaggerate her sufferings. Neither was the character of the pain so acute and localized as that which occurs in flexion of the uterus. Her general health was poor, slight mental or physical exercise fatigued her, and if she persisted she became so tired that she could not rest. Her sleep was disturbed by dreams that were not all dreams, and in the morning she felt quite exhausted. Before I saw her she had been treated locally and generally by several physicians, some of high standing in the profession, and others of questionable repute, and was invariably worse after being treated.

An examination by touch revealed a small uterus slightly retroverted, though that malposition was, I believe, temporary. The length of the uterine cavity measured with the sound was a fraction less than two inches. With the exception of extreme sensitiveness of the pelvic organs generally, there was no other abnormality found.

Local treatment was tried for a short time, but it was found to be injurious. She was then given systematic occupation under the direction of a skilled attendant. Massage and careful dieting were also directed. Her days were fully occupied with short alternating periods of mental and physical exercise and rest. Every afternoon she took thirty grains of bromide of sodium, and during her menstrual periods thirty grains three times a day with eight drops of tincture of cannabis Indica. Laxatives were given to regulate the bowels, and tonics occasionally when specially required. It should be mentioned that she gave up her evil habit as soon as she was made to understand its ill effects. Under this general plan of treatment she improved in every respect. She still suffers at her monthly periods, and the menstrual function is still irregular.

Comments.—This case is given as a representative of that class of cases of delayed or arrested growth of the uterus and the functional imperfection which is sure to follow, the primary cause of all being the premature excitation of the sexual organs. A sufficient number of these cases has been seen and studied to warrant the statement that when the habit of self-abuse is begun before puberty it often arrests the development or growth, or both, of the uterus, and the consequences are far more disastrous than the same practice when begun after puberty and completed growth.

Chlorosis.—Closely associated with this subject is chlorosis, a condition involving menstrual derangements due to the same defect of the uterus, being associated with lesions of the general system. Chlorosis is a condition which has usually been considered as a disease *per se*, but it appears to me to be rather a peculiar character of organization presenting invariably certain characteristics of structure which are unfavorable to high functional activity, and which predispose to certain forms of disease. Some authorities, French mostly, believe that chlorosis is a disease of the organic nervous system which appears at puberty and presents certain changes of nutrition, especially in the character of the blood. There is certainly some reason for this view of the subject. The functions of the body which are under the direct control of the organic nerve-centers are perverted apparently by some obscure derangement of organic innervation, but this appears to come from some imperfection of the nervous system, perhaps mal-development, rather than from some well-defined disease. The German pathologists hold that in chlorosis there is an arrest of growth of the circulatory and genital systems; the heart and blood-vessels being undersized and the sexual organs also. This certainly corresponds to the facts as observed clinically, and if to this be added that peculiar condition of the organic nervous system, which is undefined but probably structural, a type of organization results which presents all the tangible characteristics of chlorosis. This is the conception which I have accepted regarding chlorosis, which may be defined as an organization in which the circulatory and the genital systems are below the normal type in point of development and growth, and in which there is a state of the organic nervous system which is also below the normal and incapable of exercising the highest functional activity. These constitutional conditions combine the features of a peculiar temperament and a diathesis; the temperament being so marked as to show a tendency to disease or diathesis. It would simplify the subject if the term chlorotic temperament were used to express this constitutional condition. Viewing the subject from this standpoint, it is easy to understand that such an organization, while it might act under the most favorable circumstances of life, would be incapable of sustaining the more complex functional activities of a mature and fully occupied life. It is easy to see, also, that a chlorotic subject, when called upon to take up the functions of reproduction, when thus ill-qualified to do so by reason of anatomical defects, would naturally tend to derangements of nutrition in the form of impaired appetite, labored digestion, and the anæmia, debility, and mental depression which naturally follow mal-nutrition. So, also, would the sexual system suffer because of the undersize of the uterus and, presumably in some cases, the ovaries also, together with the imperfect blood-supply which, sooner or later, comes from the mal-nutrition. This I believe to be the true state of the body known as chlorosis, and that all the phenomena manifested by such subjects are the outcome of their anatomical peculiarities. Whether this be the proper description of chlorosis or not, it is the expression in brief of the prominent features of chlorotic subjects, and agrees with the facts observed in practice. The reason, I presume, for the different opinions held has grown out of the fact that some have accepted the mal-nutrition which is so often seen in the chlorotic, and the consequences thereof, as the disease itself; whereas these derangements of the nutritive and sexual systems are the outcome of the anatomical imperfections. The chief object in discussing the subject here is, because chlorotic women necessarily suffer from deranged and imperfect menstruation, and they naturally fall into the care of the gynecologist, and without some definite idea of the nature of this affection its rational management would not be possible.

From the very nature of chlorosis, it is clearly evident that the object of the therapeutist should be to aid in the development and growth of the subject while young, in the hope of overcoming the natural tendencies to these constitutional defects. After adolescence the most that the physician can accomplish is to overcome, as far as can be, the mal-nutrition and derangements of menstruation which arise from the constitutional imperfections.

Arrested Growth of the Uterus, associated with Small Circulatory Organs; Chlorosis.—This patient stated that when a girl she was of medium size and quite fleshy, and was said by her friends to look strong and healthy, but she was never able to endure much muscular exercise. Her appetite and primary digestion had generally been good, yet she never required a large quantity of food. Her face was rather pale while a girl, and remained so. She never was inclined to take active exercise, and, when obliged to do so, respiration was labored, and she soon became tired.

At the age of fifteen she began to show the general form of womanhood, but did not menstruate until eight months later. From that time onward she menstruated regularly, but the flow lasted only three days, and was not at all free. On several occasions, when obliged to exert herself sufficiently to slightly lower her general health, the menstrual flow was almost colorless, and lasted only two days. At twenty-one she was married. Her general health remained as before, and she proved to be sterile. I saw her when she was twenty-eight years of age, seven years after being married. She then consulted me regarding her sterility.

In general appearance she was a typical chlorotic subject. She was of medium height, quite fleshy, but not inordinately so; her hair was intermediate in color, being neither dark nor light—in fact, it might be said to be colorless; too light for a brunette, too dark for a blonde. If this dark shade had been removed, it would have been hair of a dark-flaxen color; the eyes were a gray-blue and very clear; the sclerotic coat pearly white; the skin remarkably smooth and white. The face was pale, with that greenish-yellow hue which must be seen to be fully appreciated. This color of the face differs from the yellow, dry skin of the cachectic subject, the pallor of anæmia, and the bronze of sunburn. Few blood-vessels were visible on the face or hands, and these were very small. The pulse was about eighty, but small, more like that of a child. The heart-sounds were very clear and distinct, but the impulse was weak. The area of cardiac dullness was apparently smaller than usual, but this was difficult to make out, owing to the mammary glands being large. At the time of my first examination she was feeling more than usually languid and weak because of indigestion and constipation, which had troubled her for several weeks. Her tongue was coated, and her appetite poor. On walking up-stairs quickly she suffered from "want of breath." If she stooped down and rose suddenly, she had vertigo. Toward night her ankles became slightly swollen. Her sleep was often disturbed by dreams. In disposition she was a little sluggish, good-natured, and generally cheerful, with occasional attacks of mental depression, which occurred usually at the menstrual period.

The pelvic organs were normal as regards general nutrition, except that the mucous membrane was anæmic. The position of the uterus was normal. The sound showed the cavity of the uterus to be a fraction under two inches in length. There was a slight leucorrhœa. The menses were regular, lasting from three to four days, until four months before she was first seen by me. During that time she had had a leucorrhœal discharge at the menstrual period, but nothing more.

Treatment.—Pil. hydrarg., gr. x; pulv. ipecac., gr. j, were given at bedtime, followed by a saline laxative in the morning. After this, a teaspoonful of the following mixture was given, well diluted, before meals: Strychniæ sulphatis, gr. ss.; acid. hydrochlor., ʒ j; tinct. cardam. comp., ℥ j; aquæ font., ℥ ij. This improved her appetite, and her strength increased. When she had finished the first mixture, the following was given: Ferri iodid., ℈ j; quiniæ sulph., gr. x; ext. belladonnæ, gr. ij, in pil. No. xx, one before each meal. These pills were taken with apparent benefit for three weeks, when they were stopped, and the following was ordered: Tinct. iodin., ʒ ij; potass. iodidi., ʒ ss.; syr. simp., ℥ j; aquæ font., ℥ ij; one teaspoonful, after meals, in water. During the following six weeks she took the pills one week, and the next week the tincture of iodine mixture, alternating regularly. The menses appeared at the fifth month after they stopped, but were scanty, and lasted only two days. The appetite and digestion were improved, and the anæmia was less marked. She also felt much stronger. I then prescribed ferri pyrophos., ʒ jss.; strychniæ sulph., gr. ss.; liq. potass. arsenit., ʒ j; tr. colomb., ℥ j; aquæ font., ℥ ij. Teaspoonful, in water, after meals. This mixture she continued to take for six weeks longer, omitting it occasionally for a few days. During the treatment she was relieved, as far as possible, from all care, took light exercise in the open air, and had a good supply of nutritious food in great variety, being restricted only in the quantity of fluids, sugar, and fats that she took. The menses continued from this time onward to be regular, and the character and duration of the flow were the same as they had been in her best former health, but were not improved. For several years, indeed up to the present time, which is now five years since she was first seen, she has been in fair health, but on several occasions, when she ventured to do more than usual, her digestion became deranged and her appetite poor. Anæmia has become more marked, and the menses have diminished, but she has promptly applied for treatment, and the use of tonics has restored her to her usual rather low standard of health.

Comments.—This history shows that the patient was not cured of her chlorosis, but only relieved from intercurrent attacks of malnutrition and the consequent imperfect menstruation which she had.

This is the history of the great majority of such cases when they come under observation and treatment after puberty. This shows that the whole character of the organization is below the highest standard, and hence there is a tendency to break down under ordinary taxation, and the physician can do no more than restore the patient to her usual degree of health.

Chlorosis treated before Puberty with apparently Good Results.—A schoolgirl, fourteen years old, large enough for her age, and unusually fleshy, was brought to me on account of loss of appetite and constipation. There was no evidence of puberty, except that her breasts were large, but they were mostly made up of adipose tissue. Her general appearance, color of hair and eyes, small heart and blood-vessels, white skin, pale face, and disinclination to active exercise, indicated chlorosis. Nothing was lacking but the usual anæmia and peculiar color of the face to make the case a type of chlorosis. She was directed to give up some of her school duties and devote more time to systematic muscular exercise and out-of-door life, to abstain from fat meat, sugar, and butter, of all of which she was unusually fond, and to live upon lean animal food, fish, eggs, oatmeal, fruit, and brown bread. To relieve her constipation I prescribed quin. sulph., ℈j; ext. belladonnæ, gr. ij; ext. colocynth. comp., gr. x, in pil. No. xx; one immediately before each meal. At the end of two weeks the bowels were acting too freely. One pill, night and morning, before meals, was ordered. These answered for a time, but in three weeks it was found that one pill was all that was required, and at the end of two months from the time she came under treatment, pills were given up altogether. She was then put upon the following:

℞ Hydrarg. chloridi corrosivi....................gr. j.
Liquor arsenici chloridi........................f ʒ j.
Tr. ferri chloridi,
Acid. hydrochloric. diluti....................āā f ʒ iv.
Syrupi simplicis.................................℥ ij.
Aquæ..................................q. s. ad ℥ vj.
M. Sig.: A dessertspoonful, well diluted, after each meal.

This is known as the mixture of the four chlorides, and is said to have been first used by Tilt, of London, and was introduced to the profession of Philadelphia by the late Dr. A. H. Smith. This medicine was given for one month, then omitted for two weeks, and again taken for one month. After this, she was given iodide of iron in small doses for two months. In summer she was sent to the mountains, and encouraged to ramble in the open air, to drive, and occasionally ride on horseback. The diet that was first recommended was continued, except that she occasionally indulged her fancy for sweets.

Under this course of treatment she lost flesh, and grew taller and stronger. Her pulse was markedly improved, and her appetite continued to be very good. At the age of fifteen years and three months she showed evidences of maturity, and simultaneously her appetite became somewhat capricious; backache and headache occasionally troubled her, and she was at times depressed. The mixture of the chlorides was resumed and continued for one month. Her usual order of life was continued, except that she did not ride on horseback, and was carefully guarded from overtaxation, mental and physical. The menses appeared and continued for four days normally, and were not attended with great pain. In six weeks the flow returned, and lasted the same length of time. From this onward for one year the menses were normal. After that, she went to a higher school, and tried to make up for lost time in her studies. During this time she was not seen, i. e., for about one year and four months. Then she called upon me, and the following history was obtained: Her appetite was capricious, and her bowels constipated; she had headache often; slept in a restless, dreamy way; had pain in the præcordial region and dorsal portion of the spine; was easily frightened, and had palpitation of the heart on taking exercise. The menses were delayed for two weeks, and when they returned the flow was scanty, and lasted only three days. At this time she had a more marked chlorotic appearance of the face than at any time before. The pills previously prescribed were given to keep the bowels regular, and the mixture of chlorides was given for one month, and after that she was given twenty minims of the sirup of the iodide of iron three times a day. The thought of falling behind in her studies grieved her so much that she was placed under the care of a governess, who interested her in her studies but did not harass her.

The menses became normal again, and she regained her general health, and has since continued well. She is at this time married, and the mother of one child.

Comments.—It is not possible to prove that this patient would have become a well-defined chlorotic subject, but I believe that she would, had she been neglected, as most of these cases are. In my clinical records I find several cases of this kind, and most of them have been greatly aided by care and medication similar to that used in the management of this case. The benefit of treatment has been most marked in those who came under care early in life. Those who had no treatment until after puberty, and were suffering from all the symptoms of typical cases were improved by treatment, so far as obtaining relief from deranged digestion and neuralgia, and to some extent from anæmia, but they still maintained their constitutional peculiarities, with a tendency to recurrence of the anæmia and menstrual derangements.

In those who married early and bore children (a not unusual thing for those in whom chlorosis is not marked), there was a noticeable predisposition to albuminuria and puerperal convulsions. Such cases also tend to inertia of the uterus and post-partum hæmorrhage. They very generally suffer from anæmia and nervous exhaustion during lactation.

A Marked Case of Chlorosis, complicated with Gastric Derangement.—The patient was a domestic, twenty-three years of age, and presented all the characteristics of chlorosis in a typical degree.

She had suffered repeatedly from amenorrhœa, but had always responded to tonics sufficiently to resume her duties in a few weeks.

She was attacked with vomiting, her strength failed rapidly, and she was unable to leave her room for weeks. When she took food it gave her distress, until it was rejected. Sometimes food would be vomited after having been retained in the stomach nearly an hour, but it was not in any degree digested.

Gastric ulcer was suspected, although she had never vomited blood. She was given peptonized milk as the only food. This she retained in increasing quantity, and gradually regained her usual health.

Comments.—This case shows the strong characteristics of extreme anæmia in chlorotic patients. I believe that the stomach is unable to digest food because of the anæmia, and this causes the vomiting. In such cases the peptonized food is of the greatest possible value.

Menstrual Derangements from Causes independent of the Sexual Organs.—This class of menstrual disorders is closely related, in the matter of diagnosis, to those deranged functions of the uterus due to anatomical lesions; hence the subject may appropriately be discussed here. It is only necessary to call to mind all the conditions necessary to menstruation to see plainly that constitutional diseases, acute and chronic, as well as functional disturbances of the nervous system, would act unfavorably upon the functions of the genital system. As a general rule, any constitutional affection which impairs nutrition and reduces strength very decidedly will affect menstruation. This is certainly the case when the general depression continues for any great length of time. The best example of this is seen in phthisis pulmonalis. In the advanced stages of this disease the menses usually stop altogether. The uterine function ceases under these circumstances, simply because the general system is unable to sustain it. In acute diseases, such as pneumonia or typhoid fever, menstruation may be interrupted for a period or two, but it usually reappears when the patient fully recovers from the constitutional disease. On the other hand, in degenerative diseases, such as organic diseases of the liver, lungs, heart, or kidneys, the menses often become irregular and scanty or profuse, and finally stop altogether during the remainder of the invalid's life. So, also, severe shocks or over-taxation from shock, exposure to cold, fear, grief, and extreme mental work, may cause the menses to temporarily cease. Again, either of the constitutional conditions referred to above may retard the first appearance of the menses if they are active at the period of puberty, even though the development and growth of the genital organs may not be arrested.

Amenorrhœa, or delay of the advent of the menstrual function, is the rule when these causes exist. There are exceptions to this rule, as, for example, valvular lesions of the heart and cirrhosis of the liver, may cause menorrhagia, and nervous derangements may cause premature menstruation.

The diagnosis in such cases is usually easy. By the time that the uterine function becomes deranged, the constitutional disease is so far advanced as to be easily recognized. One is greatly aided in diagnosis when the menses have for a time been regular, but become deranged without any disease of the sexual organs being present.

When amenorrhœa occurs as the result of some constitutional disease that is incurable, the special interest of the gynecologist ends when the diagnosis is made, because no special treatment is of any avail. On the other hand, in menorrhagia, when due to chronic affections of the heart, liver, or kidneys, something may be accomplished in the way of modifying the trouble, and thereby prolonging the life of the patient. Here also the management is general, not special, and hence does not come within the scope of the present work.

Premature Menstruation from Deranged Conditions of Life and Deranged Innervation.—The rule that the menses should appear after the completion of development which occurs at puberty is violated in the cases now under discussion, because the uterine function is taken up before the general development is completed. In determining the question of premature menstruation it is necessary to ascertain whether the patient is sufficiently mature in development to render her capable of taking up this uterine function. She may be old enough, but not developed enough in her general system. The causes of this too early appearance of the menses are various. It seems that opposite conditions of life produce the same results. Bad air, poor food, overwork, and impure social surroundings, have this ill effect; at least, cases frequently occur among those who are so poor that they fail to obtain all that is necessary to health.

This fact regarding the premature activity of the sexual system appears to arise from a law in Nature, which is that all plants and animals placed in unfavorable environments devote more of their energies to reproduction than those that are more favorably situated. It would appear as if they appreciated their danger of being crowded out of existence, and hence struggle more vigorously to procreate. Viewing the subject in this light it may be said, to speak figuratively, that girls and plants while stunted by living in poor soil run to seed.

The same premature menstruation occasionally occurs among those who are favorably situated in regard to the necessities of animal life. Those who have the means of supplying all their wants, real or imaginary, and lack intelligence and culture, which would enable them to profitably occupy their minds, suffer like the poor. This would indicate that the real cause of the sexual precocity was deranged innervation.

Delay of the advent of menstruation occurs among those who are situated apparently like those just described. The girl who labors out-of-doors and develops great muscular strength may fail to menstruate until past the usual age. So, also, the same thing occurs to some who live in luxury. In such cases the cause is, no doubt, imperfect innervation. In the class first described attention is given to the genital system prematurely, while in the second class the social element of life is neglected.

The general management of these patients consists in removing the cause, if possible, by placing them in such healthful surroundings as will prevent the evil. This, however, is not always in the power of the physician, and he has to meet the wants of those really in suffering. When the menstrual function has been established, though prematurely, no effort should be made to stop it. Attention should be given wholly to building up the general system. The overworked should obtain rest and good food. The nervous system should have attention. The perverted mind-action should be corrected by wholesome brain-occupation. The indolent should be stimulated to greater activity. Society is desirable for those in whom the menses are delayed, and quiet country life should be prescribed for those who have suffered from premature social excitement.

ILLUSTRATIVE CASES.

Premature Menstruation from Deranged Innervation, produced by Luxurious Surroundings and Over-Stimulation of the Nervous System.—The patient was an only daughter of wealthy parents, and was always a bright child and greatly indulged by her family and friends. She was treated at home and at school more like a young lady than a child, and was almost constantly in company. In the parlor and drawing-room she associated with her elders, and was devoted to the opera and theatre from the time she was big enough to visit such places of amusement. She often suffered from headaches and indigestion, and was always excitable mentally, and at times peevish and irritable. She menstruated first at eleven years quite freely, and the flow lasted four days. At this time she had all the appearances of girlhood. The mammary glands were slightly developed, but her form had not attained anything like maturity. From this time onward she menstruated regularly and normally. She was first seen during her first menstrual period, and then her parents were advised to change all her habits of life. She was taken to a quiet country home in summer, instead of a fashionable hotel at which she had previously passed her summers, and permitted to spend her time in the fields with her attendant, who was a woman of good common sense and experienced in the proper care of children. All excitement was kept from her, and her habits of life made regular and natural. In winter she was permitted to attend school for half the time, and the rest of the day was devoted to drawing, reading, and gymnastic exercises. Abundance of sleep in the early part of the night was directed, and cold bathing every morning. No medicine was given. Under this general management she grew in size quite rapidly, and by the time she was sixteen years old she was a well-developed young lady, and enjoyed very good health.

Premature Menstruation occurring in a Poor, Ill-cared-for Girl, from the Lowest Grade of Society.—This patient, a hospital one, was ten years and five months old when she first menstruated. She lived in one of the poorest tenement regions of the city. Her father was a drunkard, and left his family to the care of the mother, who was a washer-woman. This girl lived by begging while very small, and when older worked in a tobacco-factory. She was thirteen years old when seen in the hospital, and had menstruated regularly from the age mentioned. Her general health was poor, very poor; she had the appearance of an undersized, ill-fed, undeveloped girl, quite ignorant, and doubtless of low moral nature. She was in the hospital to be treated for specific vaginitis.

Delayed Menstruation in a Girl who was large, strong, and in good health.—The daughter of a poor farmer had spent most of her life in doing out-door farm-work. Her food was milk, oatmeal, and potatoes. She was large, muscular, and full-blooded. Between sixteen and seventeen years of age she developed the characteristics of womanhood, but at the age of seventeen years and six months the menses had not appeared. She was then suffering from occasional headaches, backache, drowsiness, constipation, and general indisposition. These symptoms, with delay in the appearance of the menses, caused her to seek advice. She was very muscular and fine-featured. The pulse was full and strong, the mammary glands well developed, and her figure was markedly of the female type. A teaspoonful of sulphate of magnesia and half a teaspoonful of table-salt in a gobletful of water were ordered every morning an hour before breakfast. The liberal use of animal food was directed. She was advised to take a vacation from her hard labor on the farm, and visit her relations who were more comfortably situated. These directions were followed out for a month, with no effect, except to relieve her constipation. The saline mixture was stopped and the following ordered: Quiniæ sulph., ℈i; ext. belladonnæ, gr. ij; ext. aloes aq., gr. iv. Pil. no. xx: one before each meal. When the headache and general feelings of *malaise* returned, I prescribed spiritus ammon. arom., ℥ss; aquæ camph., ℥ijss—a dessertspoonful every three hours. At the end of two months, she began to menstruate. There was considerable pain accompanying the flow, which was rather dark in color. The pills were continued, but she was soon able to give up one a day, and then two, and finally ceased taking them altogether. At each period, which recurred regularly, she took the ammonia and camphor mixture. Six months after her first menstruation she reported that she was regular and quite well.

Delayed Menstruation in a Patient of Marked Phlegmatic Temperament and Indolent Habits.—The daughter of wealthy parents, of average height but quite stout, and presenting all the evidences of the phlegmatic temperament, was brought to me at the age of sixteen, because she had not menstruated. I learned that she lived well, slept much, and took but little exercise, mental or physical. She had all the appearance of having arrived at puberty, and for one year had had a slight leucorrhœa, but no menstrual flow. She was ordered to take lessons in horseback-riding, and to walk for half an hour twice a day. A Turkish bath with thorough massage three times a week was also directed; I prescribed potass. permanganat., gr. xxx, in pil. no. xxx: one three times a day, before meals. This treatment was continued for about three months, excepting that at the end of one month the pills were omitted for three weeks and again taken up, and continued until the end of the three months. At this time she menstruated, and continued to do so regularly afterward. The flow was never very free, but it continued about five days each time.

Irregular Menstruation from Deranged Innervation and Anæmia.—This patient was twenty-five years of age, of sanguine, nervous temperament, and had been in good health up to the time that she was nineteen. She menstruated first at fifteen, and continued to do so regularly, until the year that she graduated in school, when nineteen years old. During the latter half of her last year in school her menses became irregular, six weeks or two months intervening between the periods. At this time her health became much reduced, but after leaving school she improved generally, and the menses became regular. At twenty-four years of age she began to indulge to excess her love for music and painting, which had always been favorite studies with her. Dyspepsia and general debility followed, and the menses became again irregular. She first came under my care at twenty-five, and at that time the menses had been absent for three months. She was quite anæmic, and her nervous system much exhausted. She was ordered to give up her favorite studies, and devote herself to regaining her lost health. She was directed to take three regular meals a day, and in the forenoon a cup of beef-tea or a glass of milk, and in the afternoon extract of malt, or else peptonized milk and a glass of claret. Before her regular meals she was given tr. nucis vom., ♏ iij; vini ipecac., ♏ ij, in a wine-glass of warm water. This improved her appetite. After meals she took a teaspoonful of the following: Tr. ferri chlor., ʒ iij; liq. arsenic. hydrochlor., ʒ j; spiritus limonis, ʒ ss; syr. simp., ℥ j; aquae font., ℥ ij. This treatment was continued for three weeks, with the effect of improving her general condition, but the menses did not return. In place of the iron-mixture she was given the permanganate of potash pills, but without any apparent effect. Iron was again given, and the menses returned after she had been six weeks under treatment. She continued to be irregular, some five and six weeks between the periods, but, as her general health improved, the intermenstrual periods became shorter, until the normal time was established. Altogether she was under observation for one year, and during most of that time she took tonics containing some form of iron. Citrate of iron and quinine, iodide of iron and whisky, potassio-tartrate of iron and wine, were the chief preparations given.

Suppression of the Menses from Acute Derangement of Innervation.—A lady, twenty-one years of age, of excellent physique, who had menstruated with great regularity from the time that she was fifteen years of age, left home for the first time in her life to visit some friends in a far-distant city. On the day that her menses should have appeared, she was alone and not accustomed to traveling, and she became much excited over her journey, and was greatly fatigued when she reached her friends. She could not sleep on the cars, and her appetite left her almost altogether. I was called to her on the third day after she left home, and a few hours after her arrival. The menses had not appeared ; her head ached very acutely ; her face was flushed ; skin dry and pulse excited. The temperature was 100° Fahr. I ordered a hot foot-bath and the forehead bathed with alcohol, and prescribed ammon. bromid., gr. xv, tinct. aconit. rad., ♏ ij, every three hours in a small glass of Vichy water. She was kept quiet in bed. After taking three doses of the medicine, she slept fairly well during the night. Next morning her headache was almost gone ; her pulse was quiet ; flushing of the face less noticeable, and she had an appetite, but the menses had not come. I prescribed camph., gr. v ; ext. lupul., gr. x ; ext. valerian. gr., x : in capsul. No. x. One to be given every three hours during the day and following night if awake. She slept well in the night and next morning began to menstruate.

Amenorrhœa from Chronic Derangements of Innervation.—This patient was twenty-four years of age, of good constitution, and had menstruated normally until six months before the taking of this history. In that time she lost her mother, to whom she was greatly devoted. This prostrated her with grief, and about the same time her father suffered reverses in business, so that my patient, who had up to this time lived in luxury, was obliged to seek employment to support herself. From the death of her mother she failed to menstruate until nine months afterward. She was greatly depressed up to the time that she began treatment, and, although her general health was good, she was melancholy, and was greatly annoyed by her new occupation and changed social position. The amenorrhœa was a great source of anxiety to her, because some of her friends had told her that it was sure to lead to consumption. I fully assured her that she was in no danger, and that her recovery was certain. This alone was a decided tonic.

I ordered the following: Strychniæ sulphatis, gr. ss; tr. cannabis Indic., ʒ ij; tr. card. comp., ℥ j; aquæ font., ℥ ij. Teaspoonful before meals. This she continued for two weeks. I then ordered Parrish's compound sirup of phosphates, a teaspoonful, after meals, in water. This was taken regularly for three weeks, when the following was given instead: Quin. sulph., ℈ ij; ext. valerian., ℈ j; ext. cannabis Indic., gr. v: in capsul. No. xxi. One before meals, and a glass of red wine after meals. This was continued for over a month. During this time she was induced to take more out-of-door exercise, and divert her mind by light amusements. General gymnastic exercise was taken, but not systematically nor regularly. When this course of treatment had been employed she menstruated, and from this time on was regular and well. In general spirits she began to improve considerably before the menses returned, but afterward her progress was rapid, and recovery complete. This case will suffice to illustrate this cause of amenorrhœa.

Imperforate Hymen causing Non-appearance of the Menstrual Flow.—This affection should be classed with atresia of the vagina, but is given here because the history of such cases resembles delayed menstruation from some of the causes just given. This condition is usually unnoticed until puberty, when all the evidences of menstruation appear except the flow, which is arrested by the imperforate, thickened hymen. The fluid which accumulates at each menstrual period distends the vagina first and then the uterus, the distention increasing at each period. Pelvic tenesmus, a feeling of distention of the vagina, and enlargement of the abdomen are the chief symptoms and signs presented.

In course of several months the suffering causes the patient to seek relief, when a diagnosis can be made by physical examination. The treatment is to evacuate the fluid by opening through the hymen. This is attended with great danger, owing to the tendency to inflammation and septicæmia. The fluid is dark, thick, and tarry in character, and decomposes quickly on exposure to air. This and the irritation of the vagina and uterus may account for the tendency to inflammation and blood-poisoning. The method of treatment found, in past times, to be the safest was to make a small opening, evacuate very slowly, and subsequently enlarge the opening, or exsect the hymen entirely. Another method is to make a free incision with the incandescent knife of a thermo-cautery, evacuate rapidly, and wash out the uterus and vagina. This method has proved to be safer since the days of antiseptic surgery, and may be adopted.

CHAPTER IV.

FLEXIONS OF THE UTERUS.

I CONSIDER flexion of the uterus as a deformity, and it certainly belongs to that order of pathological conditions. The pathology, cause, symptoms, physical signs, and treatment of flexion, all differ from version, hence a clear distinction between the two should be made in order to avoid confusion.

Anteflexion of the uterus is most frequently a congenital deformity, some arrest or derangement of development giving rise to the malformation. Occasionally it results from disease, inflammatory or degenerative, which weakens the uterus at a certain point and permits it to become bent upon itself. I shall limit myself to the consideration of flexion occurring as the result of these two causes, and shall purposely omit all deformities caused by pre-existing affections, such as adhesions of the uterine body to other pelvic organs, tumors in the walls of the uterus which by their weight bend the uterus, and pressure of abdominal tumors which crowd the uterine body to either side. Whenever flexion is produced by some such antecedent disease, I prefer to consider it as a complication of the primary affection, rather than to discuss it as a distinct condition.

The point of flexion is at the junction of the body and cervix. It may occur above or below that point, but only as a very unimportant exception to the rule. The several forms of flexion I have denominated first, second, and third. The first is flexion of the body; the second, flexion of the cervix; and the third, flexion of both body and cervix.

Taking the ground that flexion is a deformity, it may naturally be attributed to some defect of development; and in order to understand the lesions of form and structure arising from arrest or derangement of development, it becomes necessary to restate the essential points in that process as relates to the uterus.

At birth the uterus and vagina are joined in such a manner that the cervix uteri projects into the vagina but a very short distance, and about equally on the anterior and posterior walls of the vagina. After birth the uterus remains without change until puberty, except during the time of second dentition, when the palma plicata disappears from the body of the organ, with the exception of one fold which runs lengthwise. The body increases a little in size, so that the body and cervix become more nearly equal. At the same time the organ settles down into the pelvic cavity, and the cervix elongates and becomes more prominent in the vagina.

At puberty the uterus undergoes secondary development. The organ increases in size, this being especially true of the body. Until puberty the uterus differs but little in shape from that of the new-born babe, which has been already described; but at the time when menstruation or functional activity of the reproductive organs is about to be established, it assumes the form and structure of the mature organ. Suffice it to say that, as the tissues are developed, they become denser, giving to the organ the firmness necessary to support it and keep it from bending in any direction by its own weight.

There are two anatomical points bearing upon the subject now under consideration to which I desire to call particular attention:

1. The position or relations of the uterus to other pelvic organs at birth, during girlhood, and after puberty.

2. The relations of the cervix uteri and the vagina at the completion of primary formation and after secondary development.

The infantile pelvis is relatively narrower, deeper, and less curved than the adult; hence the canal formed by the uterus and vagina is straighter than after puberty. The small size of the infantile uterus, the thinness of its walls, and flaccid condition of its tissues, render it capable of bending forward or backward according to circumstances. This fact may account for the variety of opinions regarding the position of the uterus previous to puberty. At birth the uterus is high up in the pelvis, but settles down during the second dentition, as has been already stated, and forms with the vagina the arc of a smaller circle, having its concavity forward; hence the greater liability of the uterus to be anteflexed or anteverted during girlhood, if it deviates at all; but, according to Klob, the uterus is neither bent forward nor backward until puberty.

From the information obtained by the study of embryology and the anatomy of the reproductive organs, one must necessarily consider the uterus and vagina as forming one canal. The peculiar arrangement at the junction of these organs appears as if formed from an invagination, the upper part of the vagina receiving the duplication of the uterus which forms the vaginal portion of the cervix. This invagination is very slight at birth, as may be seen by referring to any normal infantile uterus. The projecting portion of the cervix at this period is about equal, anteriorly and posteriorly. During the period of second dentition, when the uterus settles down, this portion of the cervix becomes more apparent still. It will also be observed that the posterior wall of the cervix projects a little farther than the anterior. At puberty, when the sexual organs undergo secondary development, invagination progresses still further, and the cervix and vagina assume the relation of adult maturity. It should be noted that the portion of the cervix which projects into the vagina is much longer posteriorly than anteriorly. This must necessarily be so, to some extent, from the fact that the uterus and vagina form an arc of a circle corresponding to the curve of the pelvis; but the difference is slightly greater than is necessary to make the curve form part of a circle. Perhaps it would be more correct to say that the junction of the cervix and vagina forms an obtuse angle.

I am thus particular in describing these relations of the uterus and vagina, because I hope to show hereafter that arrest or derangement of the process of invagination of the cervix uteri has much to do in causing flexion.

Anteflexion of the Uterus.—I prefer to consider anteflexion of the uterus a deformity, although it is usually called a displacement, because it certainly is a lesion of form rather than position.

The pathology, cause, symptoms, physical signs, and treatment of flexion all differ from those of displacements of the uterus, hence the clearer that the distinction between the two can be made the better.

The deformities which occur at puberty are perhaps more frequently lesions of size or quantity from arrest of growth than lesions of form from arrest of development. During secondary development the infantile uterus is transformed into that of the adult chiefly by the increase in the size of the body and fundus, and the dipping down of the cervix into the vagina. When these changes do not take place properly, especially if the invagination of the cervix is arrested, the uterus becomes flexed upon itself. Other causes of this malformation there are which will be again referred to.

Anteflexion of the uterus is usually a congenital deformity, caused by arrest of development occurring during the later stages of that process. It is inferred from the clinical history of flexion that it is congenital, but this is not perhaps strictly true of all the cases that occur as primary lesions. I presume that most frequently the malformation takes place during secondary development at puberty. Occasionally it comes from some pre-existing disease, inflammatory or degenerative, which weakens the walls of the uterus at the junction of the body and cervix and permits it to become bent upon itself. Retroflexion often, perhaps generally, is developed from retroversion, the one holding a causative relation to the other, but this form of acquired flexion will most conveniently come under the head of retroversion and its complications.

Clinically considered in relation to causation there are two classes: the congenital, called so because it is usually first recognized at puberty; and acquired, because it generally appears after puberty and follows some previous uterine disease either inflammatory, or a malnutrition which reduces the quantity of tissue at a given point, and permits the uterus to bend upon itself. Flexions from these two causes constitute a class by themselves, and therefore they alone will be treated of in this connection. Flexions occur in connection with other affections, such as adhesions of the body of the uterus to other pelvic organs; tumors in the walls of the uterus, which, by their weight, bend the uterus upon itself; and pressure from abdominal tumors which crowd the uterine body out of place; but flexion in such cases is only a complication of the affection which causes it, and does not belong to the subject of flexion as a primary lesion. Theoretically, the uterus might become flexed in either direction; but practically the forward and backward, anteflexion and retroflexion, are the only two forms that occur as uncomplicated affections. The lateral flexions are, as a rule, secondary to the diseases already mentioned.

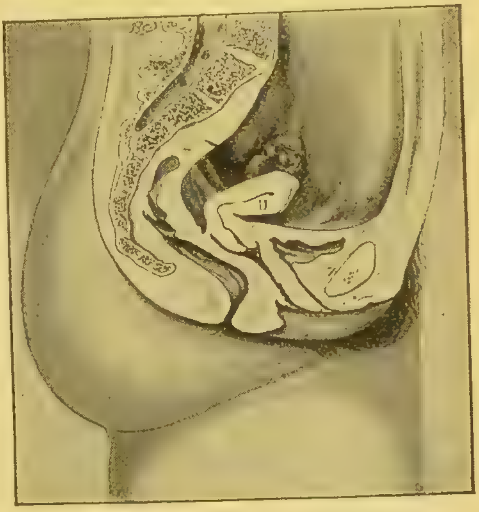


FIG. 34a.—First variety; anteflexion of cervix.

Anteflexion, which occurs as the result of imperfect development, and which is occasionally acquired from malnutrition, is by far the most common. There are three varieties of anteflexion: First, anteflexion of the cervix (Fig. 34a);

second, anteflexion of the body (Fig. 35); and, third, anteflexion of both body and cervix (Fig. 36).

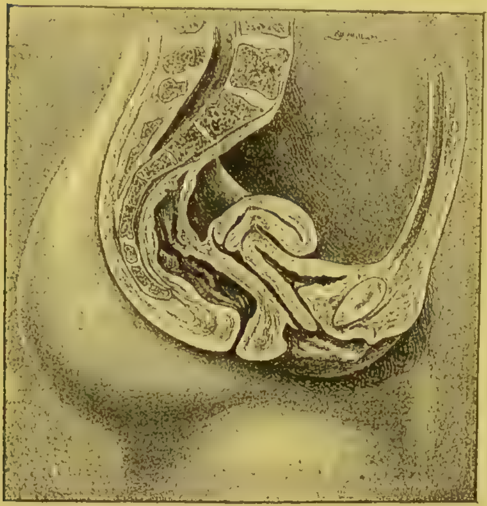


FIG. 35.—Second variety; anteflexion of body of uterus.

Pathology.—Flexion of any form necessitates some defect in the structure of the uterus. This constitutes one of the essential differences between flexion and version, which latter is simply an error of location without, necessarily, any change of structure of the uterus. The flexion is usually at the junction of the body and cervix, the point corresponding to the internal os. Flexion at any point in the body or cervix occurs only as an exception, which need not be noticed here. At the point of flexion the tissues of the uterine walls are deficient. On the side to which the organ is bent the wall is compressed and attenuated. On the other side the loss of tissue is not so marked, the thickness being but slightly diminished by the stretching. The submucous, fibrous stratum of tissue, which is said to give firmness and support to the organ, is absent or deficient on the side to which the uterus is bent.

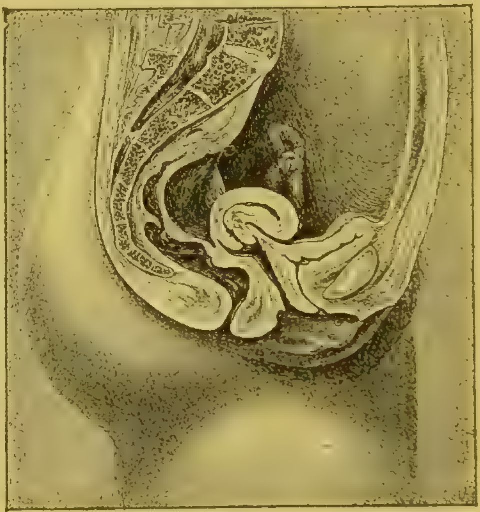


FIG. 36.—Third variety; anteflexion of body and cervix.

The effect of flexion on the uterine canal is to produce constriction or occlusion of the internal os. The external os is sometimes more open than in health, owing to traction being made on the posterior lip. The stricture thus formed gives rise to accumulation of the secretions of the uterine cavity, and to partial retention of the menstrual products. The circulation in the uterus, as will be readily understood, is interfered with. The obstruction tends to keep up congestion, and this may eventually lead to œdema and a predisposition to endometritis.

The menstrual fluid, in place of escaping passively, is expelled, perhaps, by spasmodic contractions. The submucous stratum of fibrous tissue is in some cases abnormally dense and resists the swelling of physiological congestion and this causes pain. These pathological conditions increase with time. The pressure at the point of flexion produces anæmia and atrophy of that part, and the intrinsic support of the uterus being thus diminished the flexion increases. Hence, anteflexion of the first two varieties often progresses to the third.

The anatomical appearances in flexion are well described in Niemeyer's "Text-Book of Practical Medicine." I quote that portion which applies to anteflexion of the body of the uterus: "On autopsy, flexion of the uterus may be readily recognized, as part of the posterior wall of the body, instead of the fundus, forms the highest part of the uterus. Generally, we may restore the sunken fundus to its position, but it sinks back again to its former place when we let go of it. If we remove the uterus from the body, and hold it erect by the vaginal portion, the fundus sinks down anteriorly; if it be held horizontally, it not infrequently holds its weight if the flexed side be upward, but it bends together if we reverse it." To this I would add that in the first variety the cervix projects into the vagina much farther on the posterior wall than on the anterior; indeed, in marked cases, the anterior lip of the cervix uteri is very little below a line corresponding to the point of union between the cervix and the anterior vaginal wall.

Natural History of Anteflexion.—*Symptomatology.*—Derangement of uterine function constitutes the principal point in the natural history of flexion. Menstruation, from its first establishment, is often painful—there is dysmenorrhœa. The severity of the pain bears some relation to the extent of flexion. The greater the deformity the more marked is the pain, though there are exceptions to this rule. The character of the pain is of the greatest importance. It is intermittent, and always precedes the flow. When the flow begins, the pain either subsides or becomes much less. The pain closely resembles that which occurs in abortion in the early months of pregnancy. The reason, I presume, is that while the fluid is accumulating in the uterine cavity, pain is excited by distention; but the flow when once started, continues with less expulsive effort. Painful menstruation often occurs without flexion, but in such cases the pain continues throughout the whole period, or during the early part of it, and is not relieved by dilatation of the cervix; while in flexion it precedes the flow, and is relieved temporarily by dilatation. This pain, at the commencement of menstruation, is the most prominent symptom in the history of flexion as it occurs in the young girl. The trouble tends to increase gradually. If the patient gets married, all the symptoms usually increase. Should she become pregnant, there is great liability to miscarriage during the early months. The effect of the pregnancy, however, in part at least, is to remove the deformity, even when miscarriage occurs, so that pregnancy is likely to occur again, and go on to full time, and the deformity is cured completely. Checking the menses by exposure to cold, or any cause which will produce hyperæmia of the uterus, or endometritis, promptly increases the dysmenorrhœa, and gives rise to new symptoms. Leucorrhœa, backache, local tenderness, deranged digestion, and nervous disturbances, are all added to the original symptoms. Sometimes in anteflexion frequent micturition is a marked symptom.

There are all varieties and degrees of prominence of the symptoms in the natural history of flexion. The dysmenorrhœa which begins at puberty may continue, and increase but little through life. This is most likely to be the case if the individual remains unmarried, and can avoid all the conditions which tend to aggravate uterine disease. On the other hand, the dysmenorrhœa may increase in severity during each succeeding menstruation, and after marriage become intolerable. In the intervals between the menstrual periods the patient in her early life is free from trouble, but eventually symptoms of uterine and vaginal inflammation are manifested. Constitutional derangements, especially of the nervous system, follow, and in time we have the broken-down, miserable patients, familiar to all practitioners. Such patients often seek relief in the use of stimulants and opium, which only soothe for a time, but eventually aid in undermining the health and strength of the unfortunate sufferers.

Owing to the fact that all imperfectly developed organs are less able to resist the causes of disease, the subjects of flexion are very liable to pelvic peritonitis and diseases of the ovaries and Fallopian tubes, with all the suffering which these affections give rise to.

Physical Signs.—Although the history alone might lead one with a tolerable degree of certainty to suspect the presence of flexion, the physical signs must be depended upon for an accurate diagnosis. The physical signs of flexion arise from the changed relations of the body and cervix to each other. These signs are detected by the touch and the uterine probe. The touch may indicate that the cervix is in its normal position, or is anteflexed, the os pointing toward the introitus in the same way that we find it in retroversion. The vaginal portion of the anterior wall of the cervix is much shorter than the posterior. Carrying the finger along the anterior vaginal wall, the body of the uterus can usually be felt bending forward. The bimanual examination reveals the deformed condition of the uterus in lean patients, whose abdominal parietes are yielding; but in fleshy subjects with rigid abdominal muscles, very little can be learned by this mode of exploration. When rigidity of the parts is the obstacle to exploration, an anæsthetic may be used with great advantage, as practiced by Sir J. Y. Simpson.

When the signs thus obtained point to flexion, the diagnosis should be confirmed by using the sound. Much trouble is often experienced in introducing this instrument. Indeed, it is impossible in extreme flexion to carry the sound into the uterus without first straightening the bend at the junction of the body and cervix. To do this, the cervix should be seized by a tenaculum, and gently drawn downward, while at the same time the fundus is pressed upward and backward with a probang. In this way the canal is partially straightened, and the sound can be introduced. There are cases where it is only necessary to curve the sound properly and manipulate with care, and the point of flexion can readily be passed. When the sound passes into the body of the uterus in the direction indicated by the touch, the diagnosis is complete. While there are many conditions which might present the signs of flexion as obtained by the touch, the combined testimony of the touch and sound are sufficient to make the diagnosis sure.

Causation.—There are several causes of flexion, and this may account for the different opinions held by authors on this subject. The errors, I presume, come from investigators accepting the cause found in a limited number of instances as applying to all cases of flexion. Some of the more important causes assigned may be briefly noticed.

Rokitansky considered that the peculiar density and arrangement of the mucous membrane of the cervix and lower part of the corpus uteri formed one of the chief supports of the organ, and gave it its slight anterior inclination; consequently, he looked upon the pathological state of this layer as the basis in the development of uterine flexions. He thought the uterus bent upon itself, from circumscribed atrophy of one of its walls, arising from inflammation. He claimed that the glands of the mucous membrane, becoming distended from imprisoned secretions, so pressed upon the other tissues as to cause atrophy at that part. When the distended glands ruptured and collapsed, the part rendered thus defective permitted the uterus to bend upon itself. Several eminent writers on this subject, Dr. Ludwig Joseph being the most recent, after careful observations, have been unable to discover this peculiar condition of the mucous membrane and its submucous layer to which Rokitansky alludes. If they are correct, further discussion of this supposed cause is useless. Should Rokitansky be right, the cause he favors would chiefly affect cases of acquired flexion; while the majority of cases occur before we have any evidence that inflammation preceded it.

Virchow attributes the primary cause of flexion to congenital shortness of the anterior uterine ligaments, which drag the body of the uterus forward, or flex it. The uterus being held in this position, pressure results, which leads to atrophy of the tissues, and thus all the conditions of flexion are present.

Klob, who is one of the best authorities on uterine pathology, doubts the views expressed by Virchow, and states that with the normal firmness of the tissues the uterus is not likely to be deflected by the cause in question. He also calls attention, as a reason against the theory of Virchow, to the fact that false membranes or short ligaments, which would incline and fix the fundus forward, would necessarily cause pressure on the fundus of the bladder. This would cause the bladder to distend more in its lowest portion, which would press the lower part of the cervix uteri backward, and in place of producing flexion would cause anteversion. Klob admits that the cause assigned by Virchow may produce or maintain flexion, but only when there is defect of tissue in the uterus itself, arising from some preceding cause.

The relation of the bladder to the uterus is looked on by some writers, including Virchow and Ludwig Joseph, as of some importance in the etiology of flexion. The uterus is known to make a descent corresponding to the variations in the shape of the bladder, which in fœtal and infant life changes from the elongated fusiform to the short ovoid shape, and its fundus, thus approaching the floor of the pelvis, draws the attached uterus with it. As the cervix uteri is closely attached to the posterior surface of the bladder, it will be readily understood that perverted development in the connections of the two organs might lead to flexion.

The only causes which I consider worthy of discussion in connection with anteflexion, when it occurs as a primary or uncomplicated disease, are: 1. Malformation resulting from arrested or imperfect development. Flexion arising from this cause may be classed among the congenital deformities. 2. Deformities arising from inflammation and degeneration of the uterine walls on one side. This will include atrophy of the anterior uterine wall at the os internum from inflammation and distention of the cervical glands; also fatty degeneration in advanced life, and excessive involution after parturition, by which one of the uterine walls is weakened at the junction of the cervix and body. These may be called acquired flexions.

I purposely omit a number of conditions usually given as causes of flexions, such as metritis, enlargement of the corpus uteri, pregnancy, uterine tumors, abdominal tumors, accumulations of fluid *in utero*, ascites, fecal accumulations, and adhesions from inflammatory exudations. Several of these causes, such as pregnancy, produce flexion so very seldom that they may be treated as exceptions to the ordinary laws of pathology, and are of no practical importance. The others named are more important than the flexions which they produce, and I should prefer to discuss flexion occurring under such circumstances as a complication of the primary affection. It is, to say the least of it, objectionable classification, to discuss the primary and most important disease as the cause of a consecutive affection, and one which does not always follow.

Regarding the first cause—imperfect development—I can readily see how flexion might occur therefrom. During the time when invagination of the lower portion of the cervix and upper part of the vagina takes place, the process is liable to progress farther on one side than on the other. Should the posterior vaginal wall become reflected much higher than the anterior, the attachment of the vagina, being lower on the anterior surface of the cervix, would naturally pull it forward. From the fact that this malformation at the junction of the uterus and vagina is present in the vast majority of cases of anteflexion of the cervix, I have looked upon it as one important cause. If this arrangement should tend, as it probably does, to bring the cervix forward so as to flex the uterus to a slight degree previous to its complete development, the pressure at the point of flexion would arrest the growth at that point, and then the wall would become more attenuated still, and flexion of the body would be produced.

Imperfect development may cause flexion in another way. The infantile uterus, having little strength of tissue to support itself, might readily become flexed, and so remain during the period of secondary development. I am aware that good authorities, such as

Klob, state that previous to puberty the uterus is neither bent backward nor forward; but other observers have found the infantile uterus anteflexed in many cases, and one can readily understand why the organ might remain so. The position in sitting at school and in sewing so often maintained by girls, constipation, and improper clothing, all tend to retard development and hence produce flexion. The uterus might readily increase in size at all parts except the portion compressed at the point of flexion.

Flexion occurs also from excessive development of the cervix. The unnaturally long cervix pressing upon the posterior wall of the vagina is inclined forward, while the body of the uterus remains in its normal axis. This produces slight flexion, which in time becomes greater, on the principle that the deformity, once established, tends to increase.

When flexion is caused by inflammation, the explanation given by Rokitansky and already referred to, applies in some cases of acquired flexion. Irregular involution is doubtless one of the causes of flexion when it occurs after confinement or miscarriage. If pressure was brought to bear on the cervix, fundus, or both, so as to favor flexion, involution might go on beyond the normal limits at the point of pressure.

Treatment.—A brief review of the various plans of treatment will, I believe, show that while they are of great value, and capable of giving relief in many cases, still it will be found that they do not fully equal all demands. The use of extra-uterine pessaries will relieve some of the prominent symptoms, but will not overcome the deformity. Intra-uterine pessaries, while they sustain the uterus in its normal shape, are objectionable in some respects; they are often difficult to introduce, are not easily held in position, and are liable in some cases to cause so much irritation as to make their prolonged use dangerous to life.

The surgical methods which have for their object only to relieve the symptoms or evil consequences of flexion, are chiefly dilatation and division of one wall of the cervix. Dilatation is certainly of much value, but the improvement is often, indeed generally, only temporary. Division of one side of the cervix answers the same purpose as dilatation, and the effect is not more lasting. But neither of these modes of treatment overcomes the deformity altogether, and seldom permanently cures the troublesome symptoms. The merit of dividing the cervical wall appears to me to be, that it may correct the conditions of the flexion which cause sterility, and when that is accomplished, and pregnancy follows, the development of the uterus during gestation permanently cures the malformation as a rule. If pregnancy does not follow, the patient is not always improved, except temporarily, by the treatment.

The objects to be attained in the treatment of flexions of the uterus are, to straighten the organ and to keep it so until the defective portions of its walls become developed sufficiently to render it self-sustaining. Should the means used fail to overcome the deformity, the next aim should be to relieve the patient from the consequences of the flexion by other means, such as dilating the canal of the uterus, or dividing the posterior wall of the cervix after the manner of Sims. The means to be used in the management of flexion must be adapted to each case, and hence the subject resolves itself into, first, the treatment of flexion of the cervix; second, flexion of the body of the uterus; and, third, flexion of both.

It follows, naturally, that the treatment of flexion of both the body and cervix—i. e., the third form mentioned—should include the treatment of the first and second forms.

The treatment of flexion is as follows: When the vaginal portion of the cervix is unusually long and conical, amputation may be called for, and is often followed by very satisfactory results. In the majority of cases a less important operation will answer. By clipping out a V-shaped piece in each lateral edge of the os, and extending upward from an eighth to a fourth of an inch, a few of the circular fibers are divided. This permits the longitudinal fibers to contract, and thus shortens the vaginal portion of the cervix.

By far the most frequent and important lesion that occurs in the connection of the uterus and vagina is the imperfect invagination of the anterior wall of the cervix, which has been described under the head of pathology. To overcome this deformity, I have adopted the following plan of treatment: The patient is placed on her left side, and Sims's speculum is introduced. The anterior lip of the cervix uteri is seized with a tenaculum, and the cervix drawn backward toward the hollow of the sacrum. This puts the anterior column of the vagina on the stretch, at the point where it is reflected on the cervix. The vaginal wall is then divided transversely with the scissors, about three fourths of an inch from the os uteri, the incision being from a quarter to three eighths of an inch deep (Fig. 37). The vaginal wall is dissected up, so that when the incised portion is put upon the stretch the sides will come together. In other words, the upper and lower edges of the incised central portion of the vaginal wall are drawn apart, and the sides brought together to fill the space, so that the transverse incision now appears as a longitudinal one. Sutures are introduced, to keep the parts together till they unite (Fig. 38).

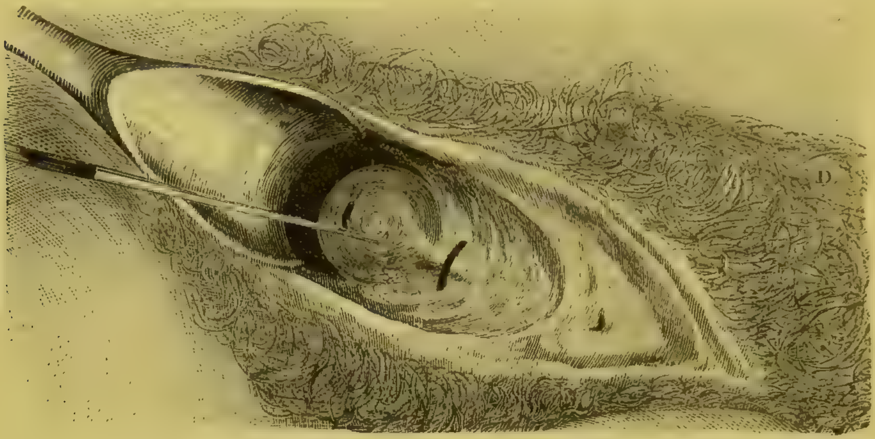


Fig. 37.—Operation for imperfect invagination. The incision.

If the uterus is slightly below its normal level, and inclined to retroversion (a condition not uncommon in anteflexion), much benefit will be obtained by introducing a double-lever pessary, largest at its posterior extremity. This will hold up the uterus, and, by making pressure in the posterior vaginal *cul-de-sac*, draw the cervix backward, and thus hold the edges of the wound together and favor union. The effect of this simple and safe operation is to bring the anterior wall of the cervix farther down into the vagina, and permit it to extend backward more toward the axis of the pelvis, where it ought to be. This plan of treatment I have found to be sufficient for the relief of flexion of the cervix uteri in many cases.

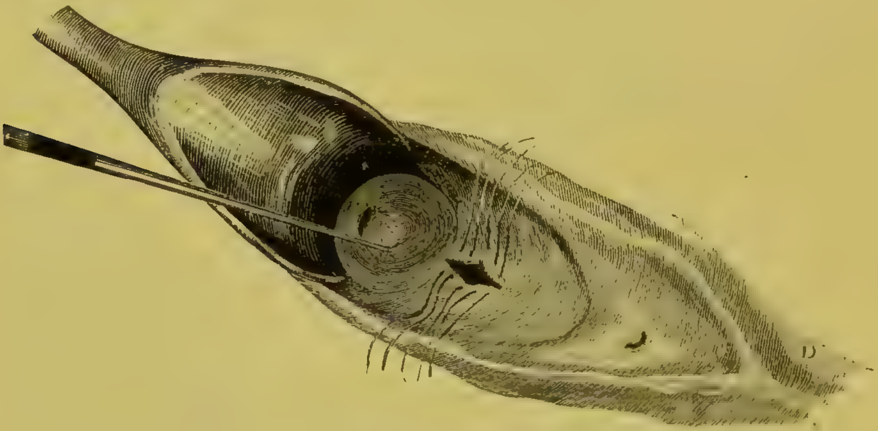


Fig. 38.—Operation for imperfect invagination. Sutures in position.

The treatment of flexion of the body of the uterus requires first that the organ should be made straight, and then that it should be kept straight, as already stated. The first object can be accomplished most easily by the use of Elliott's uterine adjuster (Fig. 39). I am indebted to Dr. T. G. Thomas for the knowledge of the method of using this instrument. It is similar to a uterine bougie, with a round metallic disk at its end. By turning this disk, the point of the instrument can be bent forward or backward at the will of the operator. In using it to straighten the flexed uterus the instrument is carried forward and passed into the uterus; the disk at the end is then turned in the reverse direction, and the instrument, carrying the body of the uterus with it, is bent in the opposite direction until the body and cervix uteri are brought into line with each other. There are certain precautions necessary in using this instrument to straighten a flexed uterus, but these will be brought out in the history of cases which follow.

In straightening the uterus with Elliott's adjuster it is useful to bend the uterine body backward beyond the line of the cervix when this can be done without causing much pain. The stretching of the wall of the uterus at the point of flexion stimulates nutrition and gives strength to the weak part. By repeating this treatment many times, much relief is given, and much progress made toward finally overcoming the deformity.

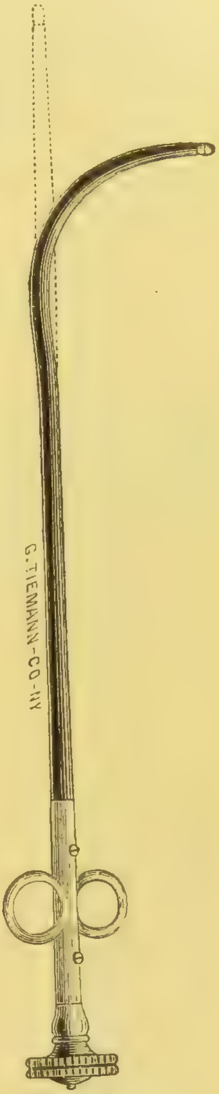


Fig. 39.—Elliott's uterine adjuster.

To keep the uterus straight in anteflexion of the body, two of the many methods commended I have found useful—the first being the use of a retroversion pessary to draw the uterus backward, as suggested by Emmet, in order to bring the cervix on a line with the body of the uterus.

The other means is the intra-uterine stem with a vaginal pessary to keep it in position; the glass or hard-rubber stem and a closed ring pessary of soft rubber answers very well (see Fig. 40).

In using the intra-uterine stem the greatest possible care should be employed because of the great danger of exciting inflammation. Before resorting to the use of this instrument all congestion and irritability should be subdued as far as possible, and the uterus should be trained to tolerate a foreign body in its cavity. To accomplish this, all the ordinary means for the relief of metritis should be employed. Cocaine, which has proved to be of great value in other departments of surgery, is a great help to the gynæcologist, especially in the management of the class of cases now under consideration. By the use of this agent the extreme hyperæsthesia, which renders the use of the sound not only painful but dangerous, can be completely overcome. When I first began to use cocaine I was fearful that, while the sound or adjuster could be used without pain under the effects of this local anæsthetic, there might be as much danger of causing inflammation as there would be without it; but experience has proved that my fears were groundless. I prefer a two-per-cent solution, and depend upon repeated applications to produce the desired effect. This is a safe way of using cocaine. At the time of using the solution it should be at about the temperature of the body, and it should be introduced with a pipette. I apply it to the canal of the cervix and os internum, and in a few minutes pass the sound just beyond the internal os. If this causes much pain, I make another application and try the sound again; and if it can be easily introduced, I permit it to remain in the canal for a minute or two.

At the next treatment I repeat the application and use a larger sound, and, if this is well tolerated, I pass the pipette into the cavity of the body and apply the cocaine. If that causes no pain, I use the Elliott adjuster and straighten the uterus, if I can do so without causing suffering. At each subsequent use of the adjuster I apply cocaine until the tenderness disappears. Then the cocaine is omitted, and if the sensitiveness does not return I feel sure that the stem pessary will be tolerated.

I am inclined to think that cocaine aids in relieving inflammation. Its immediate effect is to relieve congestion, and although the hyperæmia returns after the effect passes off, I do not believe that it does so to the original extent.

Defects of the canal of the uterus are frequently associated with flexion. In some cases the whole canal of the cervix is too narrow, and in others there is a stricture at the internal os. To overcome these defects, and to aid in correcting the flexion, several methods have been employed, the chief among them being incision and dilatation. When the constriction is at the external os uteri, I prefer incision followed by dilatation, easy and gradual, or forcible. The first consists in passing graduated sounds, the other in using the uterine dilator (see Fig. 16).

I prefer the forcible dilatation when there are no contra-indications, such as extreme sensitiveness; but I do not approve of carrying the dilatation beyond that which is sufficient to admit a No. 12 or 16 English sound. The extreme dilatation practiced by some, which is carried to a point sufficient to admit the index-finger, is dangerous and unnecessary. In cases complicated with endometritis, adenoma, or stenosis at the internal os, I employ free dilatation, curetting, and packing with gauze. This treatment has been successful in so many cases that I now give it first place. If the flexion returns after this the stem pessary can be employed. A fuller account of this is given in the treatment of corporeal endometritis.

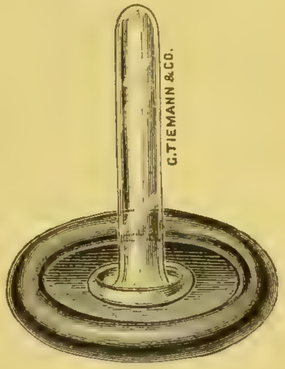


FIG. 40.—Glass stem, with soft rubber base.

Finally, it may be noted that success in the treatment of flexions depends upon the careful use of the means suggested, avoiding, as far as possible, the ever-present danger of exciting inflammation, which may make matters far worse. And much depends upon the age of the patient. It is always more easy to correct deformities in the young than in those of more advanced life. It should also be borne in mind that there is a tendency for the flexion and all consequent symptoms to return unless utero-gestation follows. On this account I have classified the results of my treatment in married women under two heads, viz., relieved, and cured. The former embraces those who have been relieved from dysmenorrhœa, but have remained sterile, and the latter those who have been relieved and have borne children.

Ninety per cent have been relieved or cured of dysmenorrhœa, and about fifty per cent cured of sterility. Comparing my results with those of other gynecologists, I have reason to be quite in favor of the treatment that I have employed. Sims's operation—that is, dividing the cervical wall posteriorly and keeping it open—was the treatment of anteflexion years ago, and I followed that practice for a long time, but abandoned it in favor of the methods given above. Hearing very little about it now and for ten years past, I presume that it has fallen into disuse.

About seven years ago Professor E. C. Dudley, of Chicago, introduced to the profession a modification of Sims's operation that found favor with many. The doctor's description of his operation is as follows:

"Under ether the uterus is exposed by Sims's speculum. The uterine canal is dilated by means of Palmer's or a light Ellinger's dilator sufficiently to permit the introduction of a dull spoon curette. The object of the curettement is to remove any granulations that may give rise to hypersecretion or menorrhagia.

"The endometrium is then thoroughly irrigated with hot sterilized water. Then the cervix is divided backward in the median line considerably past the utero-vaginal attachment. The cut surfaces are held apart by means of two tenacula—one in the hand of the operator and the other in the hand of an assistant—while the incision is somewhat deepened by means of a scalpel, especially on the side of the cervical canal.

"On each side the surface thus incised is now folded upon itself and secured by silkworm-gut sutures. These sutures are not introduced in such a manner as to stitch the intra-cervical to the vaginal margin of the cut surface, but the cut surface is folded upon itself in a direction at right angles to this—i. e., on either side of that point at the margin of the os externum where the backward incision is commenced—and is stitched to the very angle of the incision so that the cut surface is folded upon itself, not from within outward, but from before backward. Thereby the os externum is carried directly back to the angle of the incision.

"Already the cervix has commenced to point backward in its normal direction toward the hollow of the sacrum, instead of forward toward the vaginal outlet. Then the anterior lip of the cervix is caught with a tenaculum and partially removed.

"This incision should extend to the os externum, but not into it.

"Sutures are used for the purpose of folding the exposed surface upon itself from side to side. The removal of a portion of the anterior lip is not only not a mutilation, but it may even correct a deformity, because in anteflexion the anterior lip is often elongated in consequence of the relatively greater pressure exerted upon the posterior lip by the posterior vaginal wall."

While I know that this operation is a great improvement upon the Sims operation, I must say that I prefer the methods of treatment already given.

ILLUSTRATIVE CASES.

Anteflexion of the Cervix Uteri, Sims's Operation. (Relieved.)—This patient was a strong, healthy lady, who began to menstruate at the age of fourteen years. She continued in good health, and the menses were normal, except that she had more discomfort than belongs to perfect health. About the age of eighteen menstruation became more painful, and she had some backache and occasional leucorrhœa. These symptoms increased but little until she was married, at twenty-two years of age. Then she began to have dysmenorrhœa, and occasional menorrhagia. The leucorrhœa and backache became more persistent and her strength failed. The pain at the menstrual period was not very severe; in fact, it was not at all like the violent pain often present in flexion of the body of the uterus, but it made her life quite miserable at that time. About eighteen months after her marriage she first applied for treatment, when the above symptoms were related.

The os externum pointed toward the vulva, and the vaginal portion of the cervix was slightly flattened from below upward. The invagination of the cervix anteriorly was nearly normal, but not in proportion to that of the posterior wall, which appeared to be excessive. The body of the uterus was in its normal position; the sound could not be passed until the cervix was dragged backward and brought in a line with the body.

She was treated for a time to relieve her congestion and cervical endometritis, and then the posterior wall of the cervix was divided according to Sims's method. When the edges of the wound healed, there was considerable inversion of the mucous membrane, showing that it was redundant. The protruding portions were trimmed off, and then the results of the operation were quite satisfactory in appearance. She was relieved of all her symptoms, for a time at least, but remained sterile, although the canal was large enough, and the sound could be passed. Three years afterward she was seen, and then she was complaining of leucorrhœa and occasional pelvic pains.

This case was treated fifteen years ago, and is the last one in which I have performed Sims's operation or any of its modifications for flexion.

Extreme Anteflexion of the Cervix Uteri; Dysmenorrhœa. (Recovery.)—The patient was first seen at the age of twenty-five. Her past history was that of good health. Menstruation occurred first at fifteen, and from that time onward was normal, except that it was accompanied with pain. During the first few years after puberty the pain was slight, but it gradually increased until it was sufficiently severe to unfit her for everything during the menstrual period. Her general health began to fail; she lost flesh, and became very nervous and irritable, and it was on this account that she sought relief.

I found that the anterior wall of the cervix uteri was on a line with the anterior wall of the vagina, and the os pointed toward the pubes. The posterior wall of the cervix projected into the vagina far more than normal; in fact, the cervix was hooked upward. The body and fundus were in the normal position.

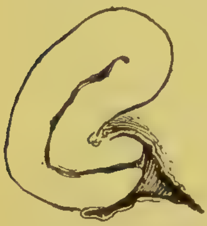


FIG. 41.—Extreme anteflexion.

Fig. 41 will give an idea of this form of flexion. It gave the impression that in the descent of the uterus the anterior wall of the cervix had been arrested in its progress by the vaginal wall, while the posterior wall of the uterus descended beyond the normal extent. It was very difficult to pass the sound; to do so, the uterus had to be raised up in the pelvis and partially retroverted. Drawing the cervix forcibly backward toward the sacrum developed a band of the anterior wall, which ran from the extreme end of the cervix upward and forward about an inch and a half, and there blended with the vaginal wall. It was easily seen that this abnormal attachment of the vagina was the cause of the flexion of the cervix.

Preparatory treatment was employed for a short time, to reduce congestion, and then the operation, already described, to correct the invagination of the cervix, was performed. The ridge of anterior vaginal wall was divided a little less than an inch from the cervix, and then very gentle traction was sufficient to draw the cervix back into its proper relations with the body of the uterus. The wound, which was made at right angles to the axis of the vagina, became parallel to it, when the cervix was carried back into its normal position. It was closed with silk sutures, carried deep down into the wall of the vagina, to make sure that the deeper portions of the wound were coaptated. When the sutures were tied, the invagination was seen to be complete, and the cervix was carried well back, quite as far as it should be; there was also a noticeable traction on the sutures, because the cervix inclined to flex forward again. To correct this, a stem-pessary was introduced, which extended about half-way up the cavity of the body of the uterus. This was held in position at first with a marine lint tampon, and when the wound healed the stem was held in place by the retaining pessary. The operation was done without ether, and the patient did not complain of pain, except when the stem was introduced into the uterus.

Ten days after the operation the sutures were removed and the union was complete; the stem was still left in place. After another week had gone, there was considerable congestion in the canal, indicated by a free discharge. The stem was removed, and an application of tannin and glycerin made. After the sutures were removed, the douche of borax and warm water was used daily, and once a week the stem was removed and the canal painted with tannin and glycerin. The next menstrual period was without the severe pain which she suffered before the treatment. Still there were backache and pelvic tenesmus. The stem was left in place during menstruation and for three weeks after, but during that time it was removed every week, and the application of tannin made.

The second menstruation after the operation, the first after the removal of the stem, was painless. Subsequently there was no recurrence of the flexion, and her menstruation has continued regular and without pain. It is now three years since she was treated, and she remains well and free from dysmenorrhœa.

I may add here, that in all cases of anteflexion of the cervix, due to imperfect vagination, the treatment given above has been successful.

Anteflexion of the Body and Cervix Uteri with Prolapsus. (Recovery.)—This patient was a little below the medium size, but was strong and active. She began to menstruate at thirteen, and continued to do so rather irregularly. She generally went over time a varying number of days. From the first, menstruation was painful, the pain gradually increasing from month to month and year to year. This pain was characteristic of flexion; it began before the flow, diminished when the flow was well established, and subsided entirely on the second day. The pain was referred to the uterus, and was intermittent. From puberty to about twenty-one years of age her health was perfect between the menstrual periods. She then began to suffer from backache, leucorrhœa, occasional ovarian pain, and gradually her digestion became impaired, and the nervous system fretted.

She was first seen at the age of twenty-four, when the above history was obtained. It was evident that all her symptoms were increasing in severity; general congestion and tenderness of the vagina, uterus, and ovaries, were found at the examination. The os externum pointed toward the vulva, and the fundus could be felt through the anterior wall of the vagina. The cervix was normal in size, and projected into the vagina in due proportions, anteriorly and posteriorly. The uterus rested low down in the pelvis, and the cervix appeared to be bent forward by the pressure upon the pelvic floor. These signs, obtained by touch, were all confirmed by the sound and speculum. The sound was passed through the os internum with difficulty at first. There was no change in the structures of the uterus except the flexion; the congestion was well marked, and there was slight leucorrhœa, indicating that cervical endometritis was being developed.

The treatment of this patient consisted in remedies to improve digestion. Bromide of sodium was given to quiet her nervous system. Locally, the hot-water douche was employed; the os externum was dilated, and tincture of iodine applied to the cervical canal; the uterus was raised to its proper elevation, and held there at first with a tampon, and afterward with a small Peaslee's pessary. The following week the internal os was dilated, until it admitted a No. 10 sound, and the iodine was also repeated. This caused much pain, and compelled the patient to rest in bed a few days, during which time the hot douche was continued. After this, the uterus was made straight by using Elliott's adjuster once a week. The douche and iodine were continued, and this completed the plan of treatment.

For six months this course of local treatment was followed out, the constitutional treatment being varied as the symptoms changed. The tenderness and congestion first disappeared, and the pain during menstruation gradually became less and less, and finally ceased entirely.

The patient remained under observation two months longer, and then married, and seven months later her physician reported to me that she was four months pregnant.

Anteflexion of the Body of the Uterus; Stenosis at the Os Internum, treated with Stem-Pessary. (Recovery.)—This patient had good health, but was of a highly nervous temperament, a condition which had been increased by a severe and prolonged education. She began to menstruate at fifteen, and had dysmenorrhœa from the beginning. She managed to get along by resting at the menstrual periods, and bearing her suffering as best she could, but at the age of twenty-eight gave up, and sought advice. Her general health at that time was impaired, and she was quite despondent. When first examined, the usual signs of anteflexion of the body of the uterus were found. The cervix was also slightly bent forward. The canal of the uterus was of full size, except at the internal os;

a small probe only could be passed at that point. The uterus was quite tender, and there was some catarrh of the cervical mucous membrane. Tonic and sedative treatment was begun, and the stricture was incised on two sides, with the hysterotome.

After this, a sound was passed twice a week for a time. The patient was much relieved by this treatment, but still suffered pain at the menstrual periods. The pain returned to a certain extent, at each menstruation, and at the end of a year treatment had to be renewed. At that time the patient appeared to be as badly off as when first seen. Dilatation of the canal and straightening the uterus with Elliott's adjuster gave some relief. More thorough treatment was advised, but she would not consent to give her whole time to it.

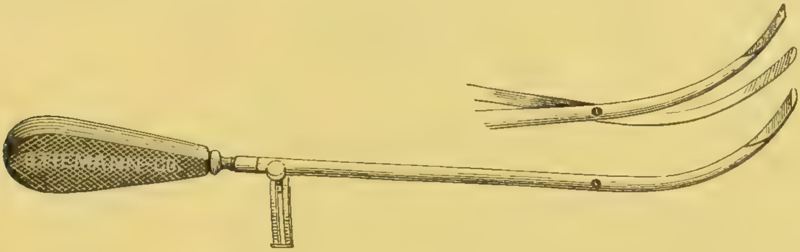


FIG. 42.—Skene's hysterotome.

Four years later the patient returned in much worse condition than when first treated. The tissues of the uterus were much harder, and there was more tenderness. Great pain was experienced upon passing the sound, and any effort to straighten the uterus was unbearable. Sleeplessness was now a prominent symptom, and she was obliged to take morphine at the menstrual periods.

I prescribed the rest-treatment, with tonics, bromides, massage, and the hot-water douche, and the application of tincture of iodine to the cervix uteri and the upper part of the vagina. When the general health had been improved by two months of this treatment, the cervical canal was dilated, under the use of cocaine, until it admitted a No. 12 sound. The uterus was then straightened with the Elliott adjuster, and a glass stem-pessary introduced. Although she was kept quiet after the introduction of the stem, the suffering was so great that at the end of two hours it had to be removed. The general treatment was resumed for about four days, and the stem was again used; this time it was worn for five days, but had to be again removed, owing to the pain it caused. The irritation was again subdued by the hot douche and cocaine applied to the canal of the cervix, and occasionally an application of iodine and carbolic acid was made. A week later the stem was used again; it then caused less pain, but she had to remain in bed, and there was still considerable distress. There was also a marked leucorrhœal discharge. It was necessary to remove the instrument about every five days, and treat the cervical endometritis.

Three weeks passed before the patient could be trusted to walk around, and it was two months longer before she could walk out and ride without causing pain. The dysmenorrhœa was less severe each month, and finally subsided entirely. The stem was worn altogether about four months; during all that time the case had to be watched and treated for a recurring endometritis, but finally the recovery was complete.

Two years have passed since the treatment was completed, and the patient remains well. The chances are, however, that the flexion will recur.

It will be noticed that the stem caused much irritation, and required constant watching. This I find is the case very often. There are few patients who will tolerate the stem unless great care is taken, and they are treated the moment that symptoms appear. The longer the trouble has existed, the more difficult it is to use the stem. The uterus becomes more dense in structure and more sensitive in old cases, and the results of treatment are not very satisfactory. This is the rule, and there are not many exceptions to it. The patient whose case I have just described is one of the oldest that I have ever successfully treated for flexion.

All the cases here given are intended to show the different forms of flexion, and the various methods of treatment employed. It will be seen that my object is not to use one method of treatment in all forms, but to adapt the treatment to the peculiar requirements of each case.

Finally, I may add that I have succeeded in relieving all cases of flexion, of whatever form or degree, temporarily at least, by the treatment described, excepting when there were complications, such as ovarian disease, or the results of old inflammations. A considerable number have entirely recovered, and borne children.

CHAPTER V.

DISEASES OF THE EXTERNAL ORGANS OF GENERATION.

ANATOMY.

The Pudendum.—The pudendum comprises all those parts that are situated at the outer and lower portion of the pelvis. It is bounded above by the lower part of the abdomen, on either side by the thighs, and below by the perinæum. In general outline it is wedge-shaped, the edge being downward.

The several parts are the mons veneris, the labia majora and minora, the clitoris, and the hymen.

The mons veneris is a mass of tissue which covers the symphysis pubis, and occupies the triangular space formed by the junction of the abdomen and thighs; it is composed of fatty tissue and rather thick integument, which, after puberty, is covered with hair. At its lower border it is divided into two folds by the upper portion of the urogenital fissure. The labia majora are two prominent rounded folds of integument, continuous above with the mons veneris, which extend downward to the perinæum. They are formed by integument covered with hair on the outer side; the inner surface is more like mucous membrane in general appearance, but it contains sebaceous glands instead of mucous follicles. The tissues of the labia beneath the skin are, connective tissue, elastic elements, and fatty lobules with underlying adipose structure. The vascular supply is abundant, forming a venous plexus.

The labia minora, also called the nymphæ, are two small folds of mucous membrane, situated upon the inner sides of the labia majora, and extending downward until they meet posteriorly, and form the thin circular band, the fourchette or frænulum vulvæ, which extends across at the posterior part of the opening of the vagina outside of the hymen. The outer surfaces of the labia minora are continuous with the labia majora, and the inner surfaces with the mucous membrane of the vestibule.

The clitoris is analogous to the penis, but possesses neither corpus spongiosum nor urethra; it is erectile in structure, and is described as having three parts—the crura, corpus, and glans. The crura are oblong, spindle-shaped processes, formed by the bifurcation of the corpus; they are attached to the rami of the ischium and pubes. The corpus is located in the median line beneath the pubic arch, and terminates anteriorly in a rounded extremity, the glans.

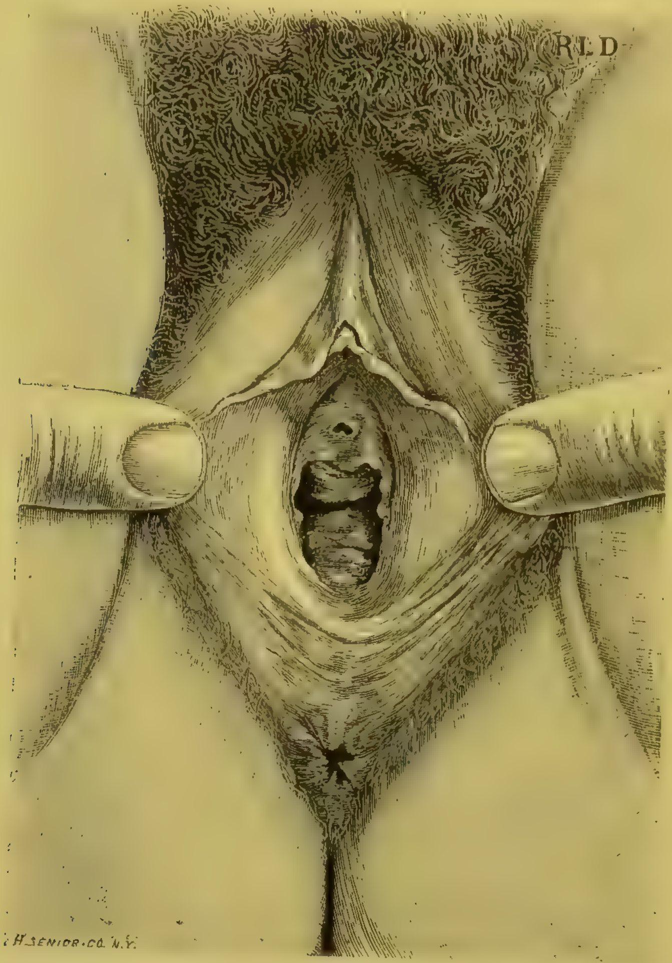


FIG. 43.—The external genitals of a woman who has borne children.

The relations of the clitoris and the labia minora are as follows: Each labium divides anteriorly into two folds, which surround the glans clitoridis, the superior folds meeting to form the preputium clitoridis; the inferior folds being attached to the glans, and forming the frænum.

The vestibule is the triangular, smooth surface, bounded above by the clitoris, on either side by the nymphæ, and below by the anterior vaginal wall. Just above the junction of the vestibule and vagina the meatus urinarius is situated. It is distinguished by its projection beyond the general surface of the vestibule. The hymen is a thin semi-lunar fold covered on both external and internal surfaces with mucous membrane, and stretches across the posterior part of the orifice of the vagina. It is a continuation of the vagina (Budin). In fact, the hymen covers the orifice of the vagina, closing it completely, except a small, crescentic opening just below the meatus urinarius. It varies in different subjects in regard to its shape, hence the above description can only be taken as that of the typical form—the deviations from this type will be referred to in connection with the pathological conditions of the hymen.

The meatus urinarius is situated in the median line, at the junction of the lower margin of the vestibule and the margin of the anterior wall, about three quarters of an inch below the clitoris. It is kept closed by the muscular tissue of the urethra, and presents a puckered appearance and projects slightly beyond the general plane of the vestibule.

The line of junction between skin and mucous membrane runs along the base of the inner aspect of the labium majus, passes down beside the base of the outer aspect of the hymen, and through the fossa navicularis.

The deeper structures of the external parts of generation are mostly glands and blood-vessels with connective tissue—the arrangement of the two latter giving the characteristics of erectile tissue.

The glands are of two kinds, the sebaceous and mucous. The sebaceous glands are abundant in the tissues of the nymphæ; they furnish a yellowish-white secretion, which has a peculiar odor. In those who are not quite cleanly in their habits this secretion accumulates beneath the upper folds of the nymphæ, around the glans clitoridis.

The mucous glands are of two varieties—the glandulæ vestibulares majores and the glandulæ vestibulares minores.

The glandulæ vestibulares minores are about six in number, and are situated about the meatus urinarius; they are of the compound racemose variety, and have short ducts with large orifices. Sometimes one or more of these ducts is found, much enlarged, and looking like a *cul-de-sac*, large enough to admit the point of a small catheter.

The glandulæ vestibulares majores are two in number and about the size of a pea, and are of a reddish-yellow color. They are situated at the posterior extremity of the bulbi vestibuli, and are partially included in the bulbi, or, more properly speaking, the glands and the bulbi overlap each other.

They, like the glandulæ minores, are of the compound racemose variety, and their acini open into a duct, more than half an inch in length, which is wide where it leaves the gland, but becomes narrower toward its orifice. These ducts, in their course, run along the inner side of the vaginal bulbs, and terminate in front of the hymen, about midway from the base of the vestibule and the posterior border of the hymen, or its remains.

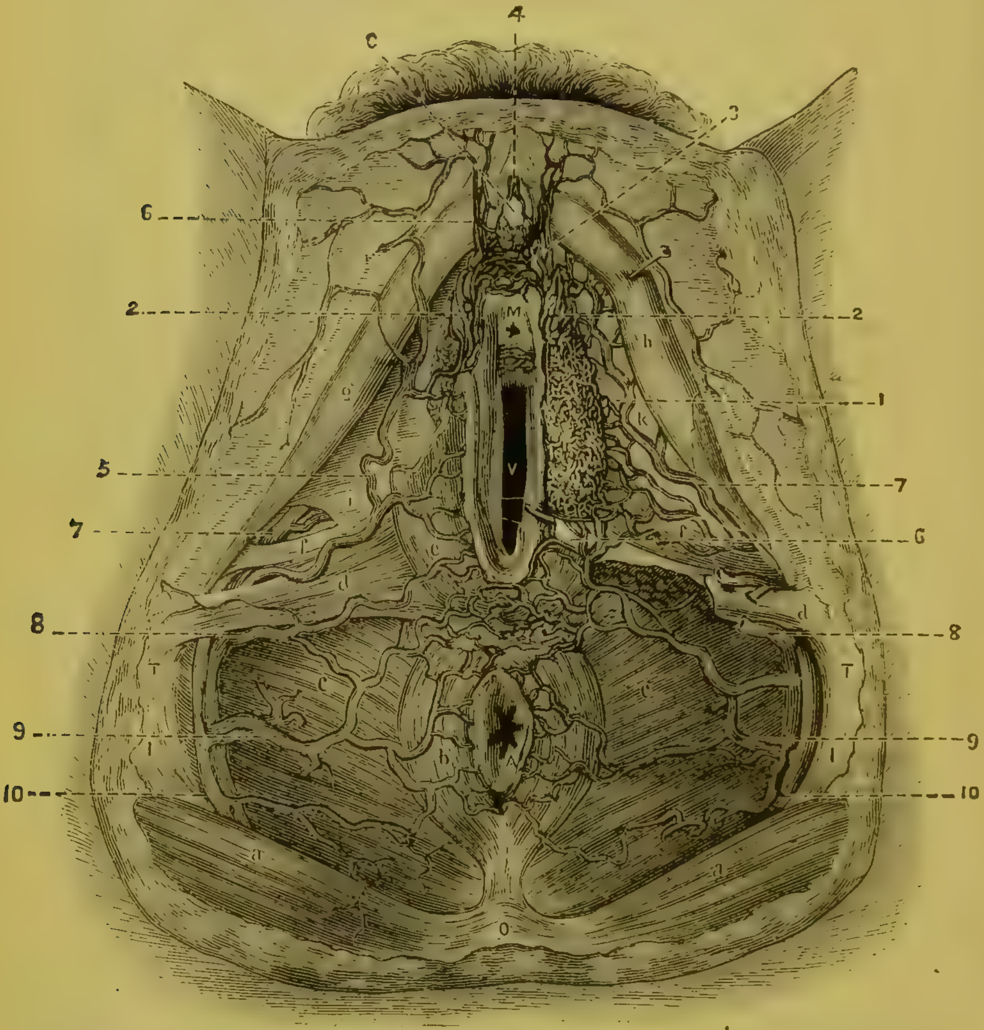


FIG. 44.—The superficial veins of the perinæum (Savage); *c*, corpus clitoridis; 1, 2, 3, corpus cavernosum urethræ; 5, anterior superfical perineal veins; 7, dorsalis clitoridis vein; 8, 9, 10, pudic vein and primary branches; *d*, tuberosity of ischium; *o*, coccyx; 6, vulvo-vaginal gland; *a*, anterior border of gluteus maximus muscle; *b*, superficial sphincter and muscle; *g*, erector clitoridis muscle; *h*, left crus clitoridis.

Later on, about the tenth week, the genital cleft forms; this is a depression in the skin which gradually extends deeper and deeper until it communicates with the allantois and the rectum, and becomes the cloaca (Fig. 50).

The structure which lies between the rectum and the allantois grows in a downward direction, dividing the cloaca into two parts; that which is situated anteriorly is the urogenital sinus into which Müller's ducts open; the posterior part becomes the anus, while the lower end of this downward growth forms the perinæum (Fig. 51).

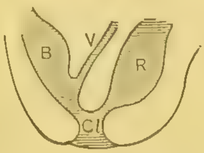


FIG. 50.—The depression has extended inward and become continuous with the rectum and allantois, forming the cloaca (*Cl*).

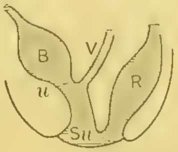


FIG. 51.—The cloaca is dividing into urogenital sinus (*Su*) and anus by downward growth of perineal septum.

The upper portion of the urogenital sinus, becoming more and more contracted, forms the urethra, the lower part remaining as the vestibule (Figs. 52 and 53).

As has elsewhere been stated, the ducts of Müller unite to form the vagina. The clitoris is formed from the genital eminence, and the labia minora from the edges of the genital cleft.

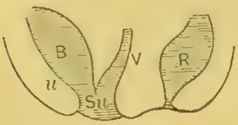


FIG. 52.—The perineal body is completely formed (Schroeder).

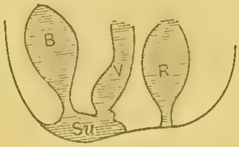


FIG. 53.—The upper part of the urogenital sinus has contracted into the urethra; the lower portion persists as the vestibule (*Su*) (Schroeder).

From this brief consideration of the manner of formation and development of the external genital organs their malformations are the more readily understood. Thus, if the depression which is known as the genital cleft fails to be formed, complete atresia of the vulva results. If the partition between the rectum and vagina is not developed, the condition known as atresia of the anus results. From the description already given, it will be seen that this is nothing more than the continuance of the cloaca. In other cases the urethra fails to be developed, and there is then a persistence of the urogenital sinus, or what is commonly known as hypospadias.

Hermaphroditism.—In hermaphroditism both ovaries and testicles, or one of each, exist in the same individual; these cases are extremely rare, though they have been observed and described by Hildebrandt, Bannon, and others. In false or pseudo-hermaphroditism a condition exists in which the external genitals appear to belong to the opposite sex. Thus, the clitoris may be so hypertrophied as to resemble a penis, and the labia minora be so closely in apposition as to be mistaken for a scrotum; or, on the other hand, the individual may be in reality a male, in whom the condition of hypospadias may exist, and thus the appearances seem to indicate a female. A case is reported by Otto, in which the external genitals of the individual so resembled those of a female that he lived as the wife of three husbands without the fact that he was a male being discovered; and then the mystery was only solved by medical examination. Fig. 54 represents the appearance of the organs in this remarkable case. In these cases of false hermaphroditism careful examination will settle any doubts which may have arisen. The parts simulating both scrotum and labia, when examined, will, if the individual is a male, contain the testicles; and, if a female, no such body will be found.

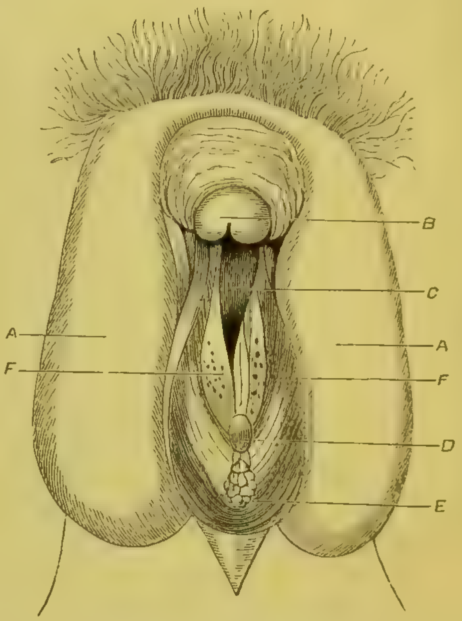


Fig. 54.—Spurious hermaphroditism (Simpson), case of hypospadias in the male making the external organs simulate those of the female: A, A, lobes of scrotum; B, imperforate penis, 1½ inch long; E, perineal fissure, 1½ inch deep, lined with mucous membrane, at bottom of which the urethral orifice, D, is seen; C, the split urethra with openings, F, of glands beside it.

It is, of course, to be borne in mind, that owing to the non-descent of the testicle, no body might be found, and still the individual be a male, and, on the other hand, that a prolapsed ovary might be mistaken for a testicle. A digital examination should also be made through the rectum for the uterus and ovaries. If the age of puberty has arrived, the presence or absence of menstruation will be a valuable diagnostic sign, and great aid may be derived from a study of the other portions of the body, as the breasts and the face, in order to detect the beginning beard, or the voice, to distinguish its tones. It is, of course, very important to make a correct diagnosis; but when this is done, the physician's duty is at an end, so far as being of any service to the patient.

DISEASES OF THE PUDENDUM.

Vulvitis.—Primary inflammation of the vulva is quite rare, if the specific form and the vulvitis of children are excluded. In nearly all the cases that have come under my observation the inflammation of the vulva has been secondary to and caused by some pre-existing affection. When it is due to gonorrhœa, syphilis, cancer of the uterus, or vaginitis, it must necessarily be treated as a complication of these diseases, rather than as an affection in and of itself.

Uncomplicated vulvitis may occur in several forms—as a simple erythema, a purulent inflammation, or as a follicular inflammation.

The erythematous variety is characterized by a general redness of the vulva, limited to the mucous surfaces, though sometimes it extends to the skin. It is usually transient, passing away without much treatment.

The purulent form is more defined. The parts are red, and covered with a copious formation of pus. The epithelium rapidly exfoliates, leaving a raw-looking surface. Occasionally only small patches of ulceration are to be seen, but these are neither large nor are they deep, as a rule.

In follicular vulvitis the mucous membrane generally is not much changed in appearance; sometimes it has a deeper color, but the whole surface is studded with small, red points, which on close investigation are found to be the orifices of mucous follicles. The size and number of these inflamed spots vary in different cases.

In this and in the purulent form the discharge is increased by a free secretion from the mucous and sebaceous glands, and this gives rise to a very disagreeable odor. There is also in most cases considerable pruritus.

Causation.—In regard to the causes of vulvitis, it is evident that the strumous diathesis and the lymphatic temperament predispose to it. All the cases that I have seen, which could not be traced to some pre-existing or specific cause, have been in strumous or phlegmatic women.

Age also has its influence. The purulent variety occurs in children, while the follicular form occurs most frequently in the aged.

Symptomatology.—These are not diagnostic. The discharge, heat, tenderness, and pruritus are the chief symptoms, but they all occur when the vulvitis is associated with vaginitis, and similar symptoms occur in many of the eruptive diseases of the vulva.

Physical Signs.—These are the same as those presented by inflammation of mucous membranes generally, and hence need not be given here.

Diagnosis.—This is made by inspection, and a careful exclusion of all other affections, such as eruptive, specific, or malignant disease.

Treatment.—The chief objects, in the management of vulvitis, are to keep the parts clean, and to separate the inflamed surfaces. This is difficult to do in children, and hence the complete relief of this affection in the young is not by any means easily effected.

In vulvitis of women I have of late years relied upon frequent washing with a solution of borax or boracic acid, two or three times in the twenty-four hours, and then after drying the parts, applying thoroughly a dry powder of subgallate of bismuth, oxide of zinc, or iodoform. This method answers very well if the patient has a nurse who can carefully employ the treatment. Equally good results have been obtained by applying to the parts, after bathing thoroughly, a solution of sulphate of zinc, three or four grains, three ounces of water, and one ounce of fluid extract of hydrastis Canadensis, or nitrate of silver, two grains to the ounce of water. After applying either of these lotions, a small pledget of absorbent cotton should be placed between the labia, to keep the surfaces apart, and to absorb the purulent discharge.

Inflammation of the Vulvo-vaginal Glands.—Inflammation of these glands in the great majority of cases is due to vulvitis. The inflammation extends into the ducts and finally to the glands themselves. While this is sometimes the result in simple vulvitis, it is far more likely to occur when the inflammation is gonorrhœal. In some cases the inflammation does not extend beyond the duct, the gland itself escaping, and then there is but little discomfort experienced by the patient unless the purulent discharge keeps up a circumscribed inflammation of the vulva around the opening of the ducts. When the glands are involved, the symptoms are those of an inflammation of the deeper structures. The closing of the ducts of these glands may result in the formation of cysts, by the retention of the secretion.

Symptomatology.—The patient will usually detect the inflammatory condition before the physician is consulted. This portion of the pudendum will be hot, sensitive, and painful; pruritus may also be present.

Physical Signs.—By inspection of the parts, redness around the mouths of the ducts will be found. The openings of these ducts are to be sought for, about the middle of the ostium vaginæ, one or each side, just in front of the hymen, or the carunculæ myrtiformes. By palpation a hard, circumscribed tumor will be found at the location of the gland.

Prognosis.—The inflammation may gradually subside, or result in the formation of an abscess. If an abscess forms it will pursue the same course, and be recognized in the same manner as an abscess elsewhere. The pus may discharge through the duct, or it may require surgical interference. Rarely the pus remains encysted for a long period. The inflammation may confine itself to the duct and not extend to the gland. In this case it will cause but little trouble, pain and pruritus being present for a short time, and disappearing with the subsidence of the inflammation, or the inflammation may result in adhesion of the wall of the duct, and, by occluding its lumen, prevent the escape of the secretion of the gland, and cause a cyst by its retention. Not infrequently the walls of such a cyst become inflamed, and an abscess results.

Treatment.—The inflammation of these glands is to be treated in the same manner as is recommended for the treatment of inflammation of the labia majora.

When a cyst forms, and its contents can not be evacuated through the duct by pressure, it may be dissected out. Although the greatest care may be exercised, this can not always be done; in that case, the cyst-wall, after being exposed by dividing the mucous membrane, may be opened freely, the contents of the sac removed, the wall of the sac thoroughly cauterized with carbolic acid, and the cavity permitted to heal from the bottom by granulation, its walls being kept separated by packing with cotton in order to prevent its closing, and again filling.

Inflammation and Abscess of the Labia Majora.—This inflammation occurs in the connective tissue, which constitutes the greater part of the labia. It is often associated with vulvitis, or may be due to the secretions of the vagina, which are of an irritant character. Blows or other injuries may also excite an inflammation in these tissues. This inflammation is characterized by redness and swelling; the latter is not circumscribed, as in the inflammation of the vulvo-vaginal glands, but is more diffuse. Like that, however, it is painful, and accompanied with pruritus. When a swelling is formed in one of the labia, it may be due to simple inflammation, or it may be a hernia, an ovary, or a hematocele.

Treatment.—The means employed for the treatment of inflammation of connective tissue elsewhere are indicated here. These are rest, evaporating lotions containing opium for the relief of the pain, salines, and flaxseed-poultices if the inflammation does not subside. If an abscess forms, it should be opened as soon as the presence of pus is determined; the opening of the abscess, and the subsequent treatment of the wound, should be managed on strictly antiseptic principles.

Varicose Veins of the Vulva.—The veins about the vulva, like those in other portions of the body, may take on a varicose condition. This commonly occurs in those who have borne children; and, indeed, pregnancy appears to stand in a causative relation thereto, although cases undoubtedly do occur in those who have never been pregnant.

Causation.—Anything which obstructs the venous circulation will, by increasing the intravenous pressure, tend to produce this varicose condition, whether it be a pregnant uterus, a tumor, or, as mentioned by Winckel, the straining at stool, in case of obstinate constipation.

Symptomatology.—A patient may have well-marked varicose veins of the vulva, and yet be entirely unaware of the fact. Or a sense of heat and irritation may be experienced of so disagreeable a nature as to cause her to consult a physician, when the presence of varicose veins may be recognized. In still other cases the fullness due to the swelling is so great as to attract her attention, though other symptoms may be absent.

Physical Signs.—Upon examination, in slight cases, the varicose condition of the veins is observed. There may, however, in more aggravated cases be so much tumefaction of the labia and other parts as to mask this peculiar condition of the veins. Holden describes a case in which a tumor existed as large as the head of a child.

The diagnosis in these cases is to be made by excluding the other affections, by the methods which are elsewhere described.

Treatment.—But little can be done in the way of radical treatment for this condition. The bowels should be attended to, so that there may not be constipation and the accompanying straining at stool. If the varicosity is marked, and shows a tendency to increase, some relief may be obtained by a pad, so applied as to give the veins the support which they lack by reason of the weakness of their walls. It should be constantly borne in mind that, when these veins assume a marked varicose condition, there is a possibility of their becoming so distended during pregnancy as to rupture at the time of delivery.

Wounds of the Pudendum.—These injuries are of three kinds—incised, punctured, and contused. They are of great interest, owing to the profuse hæmorrhage which usually occurs when the vessels of the bulbi vestibulares are wounded. Superficial wounds of the labia are not usually important; it is only when the larger vessels of the bulbi are opened that profuse and dangerous hæmorrhage occurs.

Incised and punctured wounds are usually caused by falling upon cutting instruments. I have not had any personal experience with such injuries. All I know about them I have gathered from Sir James Y. Simpson's obstetric work. He calls attention to several fatal cases of this injury, death occurring from hæmorrhage. He also states that several of these fatal cases were supposed to be caused by criminal intent. I remember, when a boy, reading an account of a gypsy woman, in Scotland, who died from pudendal hæmorrhage, and her husband was tried for her murder. The defense set up was, that the wound was caused by striking against a stick while squatting down to urinate, in the woods, where they were encamped.

Thomas records a case, not fatal, I believe, which was caused by a piece of china, from the breaking of a *pot de chambre.*

Symptomatology.—The symptoms are pain and profuse hæmorrhage, following an injury to these parts. The bleeding is sufficiently alarming to require an examination, when the character of the injury is at once detected.

Causation.—The causes are traumatic, and need not be discussed.

Treatment.—The treatment, commended by most authors, is to use cold applications and astringents, such as persulphate of iron and tannin, and if these are not sufficient, to enlarge the wound, pack it with antiseptic cotton, and apply pressure. To make the pressure effectual, the vagina should be tamponed, and a compress and bandage applied.

I am satisfied that this kind of treatment must prove very unsatisfactory. Although I have had but little experience with accidental injuries of the pudendum, I have repeatedly encountered profuse bleeding from vessels of the bulb, wounded while removing morbid growths from the pudendum. In such cases I have found it most satisfactory to ligate the bleeding points, taking up the vessels *en masse* when several of them were wounded; when it has been difficult to find the vessels and secure them in the deep wounds, I have passed a strong suture from the outer side of the labia into the vagina, and returned it so that it would include the bleeding vessels in its grasp when tightly tied. This controls the bleeding for the time, but occasionally it will start again, when the ligature becomes loosened, which it is likely to do in a few hours. When this occurs, the ligature should be tightened. If there is no subsequent bleeding, the suture can be removed at the end of twenty-four hours. I am sure that this is the most surgical as well as the most satisfactory way of managing hæmorrhage in this region. Styptics and pressure, in some cases, will only conceal the bleeding, but not arrest it; the blood will burrow in the soft tissues and complicate the injury, and also make ligature of the vessels more difficult.

Contused Wounds of the Pudendum.—These are of two degrees of severity. A slight bruise, causing rupture of only a few small vessels (which very soon stop bleeding), gives rise to an ecchymosis, which quickly disappears. Occasionally inflammation follows and an abscess develops, which is managed in the usual way.

Contused wounds, which rupture the large vessels of the bulbi vestibulares, or varicose veins of the labia, if any such exist, produce pudendal hæmatocele—i. e., an accumulation of blood in the loose cellular tissue of the parts. The pathology of this injury is the same as that of bruises or contused wounds generally. There are laceration of the vessels, and hæmorrhage into the cellular tissue.

In contusion of the pudendum there are two conditions which conspire to make the injury grave in character—the large size of the vessels wounded, and the loose character of the cellular tissue, which admits of a very large accumulation of blood. The size of the hæmatocele depends upon the size of the vessels lacerated. In case the vessel is small, the bleeding may be controlled by the pressure from the blood in the tissues; but when large varicose vessels or the vessels of the bulb of the vestibule are lacerated, the size of the hæmatocele is very great. I have seen one nearly as large as the two fists.

The course and termination of hæmatocele vary. If the blood-clot is small, it may disappear by absorption, without causing much discomfort, after the first pain of the injury subsides; but when the accumulation of blood is large, then inflammation follows, which may terminate in sloughing or suppuration, and finally septicæmia.

Symptomatology.—The symptoms are pain following the injury, and then a feeling of fullness, heat, and sometimes throbbing. In one case that came under my observation the pressure was sufficient to prevent urination, and it was very difficult to pass the catheter. The attention of the patient being directed to the location of the injury, the swelling is discovered by the touch.

Physical Signs.—The physical signs vary in the different stages of the disease. At first, the tumor is elastic and like a local œdema, except that it does not pit on pressure. After the blood has coagulated the parts are denser and slightly irregular, or slightly nodular; discoloration of the skin occurs in twenty-four hours, or less. Œdema of the skin also appears.

Diagnosis.—In regard to the diagnosis, it may be said that pudendal hæmatocele can hardly be confounded with any of the diseases of the pudendum, except pudendal hernia, and the mode of development and physical signs of the two affections are so unlike that the differentiation is easy.

Causation.—The causes of pudendal hæmatocele are predisposing and exciting. Varicose conditions of the vessels, degeneration of the vessel-walls, and marked engorgement from any cause which interrupts the venous circulation, render the vessels more liable to rupture when subjected to any injury.

Pregnancy predisposes to rupture of the pudendal vessels, and labor is one of the most prominent of the exciting causes, but the present discussion of this affection is limited to causes occurring in the non-puerperal state. The reader will find a very full account of this affection, as it occurs in labor, in a monograph by Prof. Fordyce Barker.

In regard to the exciting causes of the affection, it may be said, in brief, that they are always traumatic. Direct blows are the usual means by which the vessels are ruptured; indirect injuries—from a fall, for instance—might produce rupture of the pudendal vessels, but I have not seen any cases in which the injury was caused in that way.

Treatment.—When the patient is seen immediately, and while hæmorrhage is still going on, an effort may be made to arrest the bleeding by pressure; but if this fails after a short trial, it is best to lay the parts open, and secure the bleeding vessels in the way already described. This is quite an important operation, and requires that the patient should be anæsthetized, but the results fully justify the means. The advantages of this treatment are threefold: the bleeding is controlled effectually, and in the safest way, providing the surgeon is called while the bleeding is still going on; the extent of inflammatory action is greatly lessened or wholly avoided; and the dangers of septicæmia are guarded against by clearing out the blood-clots and securing free drainage. The rule is, however, that the surgeon is not called until the stage of bleeding is past; it is then well to wait till the patient has recovered from the loss of blood, and reaction from the shock, if there has been any, has set in, and then lay open the hæmatocele, turn out the clots, tie any vessels that may bleed, secure free drainage, and use ordinary surgical dressing. I am sure that this course of treatment is the best, being by far the safest in guarding against fatal septicæmia, and securing a more prompt convalescence, with infinitely less danger to the tissues of the pudendum.

ILLUSTRATIVE CASE.

Pudendal Hæmatoma.—A dissipated woman, about forty years of age, was brought into the Long Island College Hospital, after having received a brutal beating from her husband. She had a number of bruises about her head and face, and complained of pain in the pudendum. On examination, an enormous swelling was found in the region of the right labium. Pressure was made by means of bandages, and the swelling, due, no doubt, to hæmorrhage, was controlled so that it did not increase. She had considerable fever and depression from her injuries, but was rallied by means of stimulants and quinine. At the end of forty-eight hours after her admission the ecchymosis was so marked, and pressure upon the tissues so great, that sloughing was apprehended; even if that should not take place, the extensive inflammation and suppuration, which necessarily must follow, would have placed the patient's life in great danger from septicæmia, and made convalescence, at least, very tedious.

It was therefore decided to operate, which was done as follows: An incision about four inches long was made on the inner side of the tumor with the thermo-cautery knife. Proceeding slowly with the instrument at a dull-red heat, no hæmorrhage was excited by the incision. The clot, a very large one, was turned out, and, just as soon as the pressure was removed, bleeding started at several points in the deeper portion of the wound. The bleeding vessels were caught up by compression-forceps and ligated, and the general oozing which kept up was controlled by the cautery. The wound was then packed with lint, which was held in place by a bandage; the dressing was changed night and morning, the quantity of lint being reduced as the cavity contracted.

She made an excellent recovery, and left the hospital in two weeks from the time of the operation.

Hernia of the Pudendum.—Two varieties of hernia may occur in the vulva—one known as anterior-labial, and the other as posterior-labial. The former, which is sometimes described as inguinal labial hernia, consists in the passage of the dislocated organ by the side of the round ligament into a labium majus. The sac may contain intestine, omentum, ovary, Fallopian tube, or uterus. Winckel found six cases of this variety of hernia in 5,600 private patients examined by him; in one case an ovary was found in the left side;

in a second, each ovary in a hernial sac; in a third, the uterus; and in a fourth, the pregnant uterus.

The second variety, known also as vagino-labial hernia, occurs much less frequently. Winckel has seen but two cases, and says that the hernia passes down in front of the broad ligament into an opening in the pelvic fascia and levator ani, and appears at the posterior extremity of one of the labia majora.

Diagnosis.—This is not difficult, if due caution and care be exercised. If the patient bears down, the size of the tumor will be increased. If she be placed in the knee-chest position, the hernia can be readily reduced, going back with a gurgling sound. When she assumes an upright position, the reduced tumor will again return.

Treatment.—This consists in reducing the hernia, and retaining the organ in place by means of a properly-applied truss.

Vaginal Enterocele.—This is a form of hernia in which the intestines descend into the pelvic cavity, and may pass down either in front of or behind one of the broad ligaments.

The hernia is usually composed of small intestine alone, though it may contain omentum alone, or both intestine and omentum together. Cases have been recorded in which the large intestine came down instead of the small one.

Vaginal enterocele is usually explained in the following manner: The intestine, having found its way into Douglas's *cul-de-sac*, pushes it downward, and gradually causes the vagina to bulge inward. This may increase to such a degree that, finally, the tumor may appear at the vulva and even protrude from it.

Diagnosis.—This is not difficult if the examination is made with care, though serious errors have been made by surgeons, the tumor being considered an abscess, and opened by the knife.

A vaginal enterocele may be recognized by the following characteristics: It becomes smaller on pressure; increases in size when the patient coughs or bears down; is resonant on percussion—though, if the contents are omentum, this sign would not be present—and is easily returned if the patient be placed in the knee-chest position. It may be mistaken for an abscess, a prolapsus of the vagina, an ovarian cyst, or a dropsy of the Fallopian tubes.

Causation.—Parturition is considered as the most common cause of the hernia, the intestines being pressed down against the relaxed pelvic tissues by the expulsive pain of labor. When occurring in nulliparous patients, it is usually due to falls or to violent straining efforts.

Treatment.—Inasmuch as the sac of this variety of hernia is not liable to constriction, strangulation rarely occurs. The tumor will disappear if the patient is placed in the knee-chest position, and its retention may usually be accomplished by a pessary that will keep the vaginal wall tense. This will at least prevent the protrusion of the hernia from the vulva, though it is doubtful if any treatment will prevent entirely the entrance of the intestines into the pelvic cavity. The existence of this hernia should be borne in mind in case the patient becomes pregnant, for under such circumstances labor is often impeded by the enterocele, which, coming down in advance of the presenting part, offers a serious obstacle to its progress.

Hydrocele of the Round Ligament.—In order to understand the condition which is present in hydrocele, it is necessary to recall the anatomical relations of the round ligaments and the labia majora.

The labia, it will be remembered, are the analogues of the male scrotum, and the round ligament of the spermatic cord. These ligaments terminate in the labia majora, and are covered by an offshoot from the peritonæum, the increased serous secretion formed by this membrane constituting hydrocele.

Although the peritoneal sac does not ordinarily extend into the inguinal canal, still it may do so, and intestine or an ovary may enter this pouch. Hydrocele of the round ligament is liable to be confounded with hernia. The tumor will be translucent if it be hydrocele, and this, together with the history, will be sufficient to make the diagnosis. An aspirator needle may be employed to make the diagnosis more certain. It is an exceedingly rare disease, and one that I have never seen.

Treatment.—The fluid contents of the sac should be withdrawn by aspiration, and tincture of iodine injected.

Hyperæsthesia of the Vulva.—This disease, as the name implies, is characterized by a supersensitiveness of the vulva. Pruritus is absent, and on examination of the parts affected no redness or other external manifestation of the disease is visible. When, however, the examining finger comes in contact with the hyperæsthetic part, the patient complains of pain, which is sometimes so great as to cause her to cry out. Indeed, the sensitiveness is occasionally so exaggerated as to keep the patient from consulting her physician until it becomes absolutely intolerable. Sexual intercourse is equally painful, and becomes in aggravated cases impossible.

This affection must not be confounded with vaginismus, or with other conditions of increased sensitiveness of the vulva due to inflammatory conditions.

Causation.—The causes which produce this hyperæsthetic condition of the vulva, when not due to inflammation or the presence of urethral tumors, are difficult to recognize. At the menopause the affection seems more likely to occur than at any other period of life, and women of weak mental and physical powers are more often its subjects than those who are strong both in mind and body.

Treatment.—Various methods of treatment have been suggested, but so far as my own experience is concerned they have been in most instances unsatisfactory. The sensitive tissue has been dissected off and relief obtained for a time, the hyperæsthesia returning, however, as before the operation. Nitric acid has been applied, but without a cure resulting. The best that we can probably do for our patients is to build them up with tonics and nutritious food, and, if possible, to send them away so that they can have the benefit of a change of air and of scene, and at the same time be removed from the irritation of sexual intercourse, which of necessity aggravates and perpetuates the hyperæsthesia. I have repeatedly been able to relieve the hyperæsthesia, temporarily, by the application of cocaine in a four-per-cent solution. This will also be found useful when making examinations in cases of sensitive vulva, or in passing the sound into a sensitive uterus.

Pruritus Vulvæ.—This condition is a symptom rather than a disease in and of itself, and yet it is such a prominent one in many cases as to justify its description as an independent affection.

Pathology.—Pruritus consists essentially in an irritable condition of the nerves of the part affected. Although this is ordinarily the vulva, it may be and often is the vagina and the anus, and even the integument of the abdomen and thighs may be involved.

Symptomatology.—The patient notices an itching of the parts affected, which is at first relieved by scratching or rubbing, but later this relief is but temporary, and the friction aggravates the original trouble, until an eruption of an irritating nature appears, from which at a still later period there is an exudation, which, by the nails used in scratching, or in other ways, is carried to other portions of the body, and seems by its irritant nature to excite a similar trouble there. The itching and the burning sensations become at times intolerable, and the patient is debarred from the society of her friends. In some instances the annoyance and suffering are increased at night, and in order to obtain sleep hypnotics have to be administered.

Physical Signs.—The signs vary according to the affections which cause the irritation. These are described above in speaking of the pathology. In some cases there are no definite signs present.

Causation.—It is more than probable that pruritus is always secondary to some other trouble. A due appreciation of this fact is necessary for the institution of proper treatment, as, if it is lost sight of, and that which is in reality only a symptom is regarded as a disease, the pruritus will continue almost indefinitely, and in its chronic form will resist all remedial measures. Leucorrhœa is very commonly associated with pruritus, and appears to stand in a causative relation thereto. Other irritating fluids may also produce the same result. Of these the most common are diabetic urine and the discharges from an ulcerating cancer of the uterus. The leucorrhœal discharge which is most likely to produce pruritus is that from a uterus which is the seat of endometritis, either cervical or corporeal.

The presence of parasites may also account for the existence of pruritus.

Treatment.—From the principle already laid down that pruritus is to be regarded as a symptom of some pre-existing disease, the detection of this disease will first demand attention, and when discovered treatment appropriate thereto should follow. If there be an endometritis, the discharge from which irritates the vulva or other parts, and causes pruritus, the inflammation should be treated as advised elsewhere.

A pledget of absorbent cotton placed against the os, to receive the discharge, will be of great benefit; this should, of course, be renewed sufficiently often. Vaginal douches containing acetate of lead or carbolic acid will often give great relief. Subnitrate of bismuth may be dusted on to prevent friction of the labia against each other; this sometimes relieves the pruritus. I have found this to be one of the best local applications in the pruritus caused by diabetes; in such cases I direct the patient to keep the urine from coming in contact with the parts, as far as possible, when urinating, and to dry the pudendum and dust it over with subnitrate of bismuth. By adding an equal quantity of prepared chalk to the bismuth, it makes a powder that is more easily used.

Very satisfactory results can be obtained in the management of cases where the pruritus is caused by some appreciable disease of the organs. The greatest difficulties are experienced, however, in the treatment of that form of pruritus which occurs without any lesion of structure or accompanying affections to account for it. That there are some morbid changes in the tissues, in the violent pruritus which is experienced, is no doubt true, but so far they have not been demonstrated by pathologists, and hence the majority of authors consider that this affection is a neurosis.

In the majority of cases of this kind that have come under my observation, the skin has been bleached, in spots appearing whiter than the normal skin. It has also lost the normal elasticity. To the touch it seems harder and less flexible, but what these changes are, and whether they are related to the pruritus, are questions which have not yet been answered.

The pathology and causation of this affection are both obscure, and the treatment is equally unsatisfactory. Many of these cases prove to be incurable, and in some it is not possible to give the patient complete relief by any local treatment. This has led to the use of a great variety of agents, but none of them has proved to be reliable in all cases. The remedies that have given the best results in my practice are bichloride of mercury and emulsion of bitter almonds, one grain to the ounce; this is applied to the parts affected twice a day. A powder composed of one grain of morphine to two grains of chalk, to be applied night and morning; equal parts of tincture of opium, iodine, and aconite, and eight per cent of carbolic acid, applied once a day—all of these have been tried, and each one has proved serviceable to some extent, but there are cases which resist all these remedies.

The bichloride of mercury mixture, used alone, has been of the most service in the largest number of cases. Where it fails, I have used a solution of iodoform in ether; this is applied by means of an atomizer, and by using strong air-pressure the solution is forced into all the folds of the mucous membrane; the ether soon evaporates, and leaves a fine coating of the iodoform over the whole surface. This nearly always relieves, and if applied frequently is curative in some cases. I have also used carbolic acid and tincture of iodine, equal parts, and this nearly always gives relief for a day or more. In the following case this application relieved the pruritus permanently:

The patient had passed the menopause, and, although she had not borne children, her health had always been good. Dr. Fordyce Barker, whom she consulted, sent her to me, telling her at the same time that I could not cure her, but would give her as much relief as possible. I tried the usual remedies, with no benefit. I then used the carbolic acid and iodine, but found it difficult to apply to all the irregularities of the surface. I applied it with the atomizer, using a high pressure, so that the solution was forced into the tissues, and a deeper effect obtained than I had expected. The result of this was, that the patient suffered greatly. The first effect was sharp pain, followed very soon by relief from the itching, and numbness of the parts; in short, the anæsthetic effect of the carbolic acid was obtained in a marked degree. Following this there were great irritation and pain; the epithelial layers of the skin and mucous membrane came off as if they had been blistered, and there was much sensitiveness. During this, while the patient was suffering the most pain, she said that it caused far less suffering than the itching. When she recovered from the treatment the itching did not return for several weeks, and then only in a slight degree. I made the same application once again to several spots where there was severe itching, being careful not to cover more than a very small area. It was not necessary to apply the remedy the third time.

She completely recovered, and remained well for one year at least; and I presume she has had no relapse, as I should probably have heard from her if she had.

Eruptions of the Vulva.—The vulva may be the seat of eczema, either acute or chronic, herpes, prurigo, erysipelas, and diphtheria.

Eczema here as elsewhere consists of vesicles, or a somewhat reddened skin, from which a serous fluid escapes. This dries, and oftentimes a thick crust forms, under which pus may accumulate. If the attack does not become chronic, this crust falls off in one or two weeks, exposing a new and tender epidermis beneath. If, on the other hand, the affection becomes chronic, the tissues become thickened by exudation, and at the same time dry, and lose their suppleness. This condition is very liable to extend to the thighs and to the integument about the mons veneris and anus.

In herpes, vesicles are also present, but they are not accompanied by any redness or inflammation of the surrounding tissues. These vesicles may rupture and scales result, but, like herpetic eruptions on the lips, they are of short duration, and soon disappear.

In prurigo, small papules are seen on the affected parts. Kühn describes them as having a small, dark spot in the center, which is depressed, and containing a tenacious, reddish, gland-like mass attached to the bottom of the papilla.

Treatment.—In the acute form of eczema, in which there is free transudation of serum, I use subnitrate of bismuth or powdered soapstone, with three to five per cent of carbolic acid. When the parts are dry, I employ oxide-of-zinc ointment, carbolic-acid ointment, or glycerine and borax. In chronic forms of eczema, applications of nitrate of silver, twenty grains to the ounce of water, may be made. This may be done once or twice a week. The herpetic eruption will disappear without treatment, and the only indication is to keep the affected parts protected from friction.

Prurigo may be cured, according to Kühn, by removing these tenacious masses which have been described as situated at the bottom of the papillæ.

The vulva is sometimes the seat of erysipelatous and diphtheritic inflammation. Erysipelas is rare in adult life, and indeed may be said to occur most frequently in the very earliest infancy. In its local treatment sugar-of-lead lotions may be applied, and internally tonics and stimulants. The prescription which has given me the most satisfaction is as follows: Borax, one drachm; tincture of opium, one ounce; glycerin, three drachms; and water, three ounces. The parts should be kept constantly moistened with this.

Diphtheria of the vulva occurs in some cases when the exudation exists in the pharynx or larynx, and rarely as an independent disease. Its treatment is constitutional.

Noma, or gangrene of the vulva, is perhaps best considered in connection with the eruptive diseases. The first indication is a swelling of one of the labia majora, which becomes of a grayish-green color, followed by vesicles; the color changes to brown, and gangrene rapidly sets in.

Causation.—Noma occurs in children whose general health is poor, either from insufficient and improper food, or from having lived in squalid tenement-houses; or, indeed, from both combined. It may also occur as a complication of one of the contagious diseases—scarlet fever, measles, or small-pox.

The prognosis in noma is very grave.

Treatment.—This should be directed to sustaining the failing powers of the patient. For this purpose quinine, iron, and stimulants should be freely administered, and antiseptic dressings applied to the affected parts. It has been recommended to excise the gangrenous tissue, and to apply the actual cautery to the underlying parts.

CHAPTER VI.

DISEASES OF THE VAGINA.

Anatomy of the Vagina.—The vagina is the continuation of the genital tract from the uterus to the vulva. It is curved to coincide with the axis of the pelvic excavation; this, to some extent, renders it much shorter in front than behind. The anterior wall is about two inches long, while the posterior is nearly twice that length. The anterior wall is further shortened by the cervix uteri, which joins the vagina much nearer to the vulva in front.

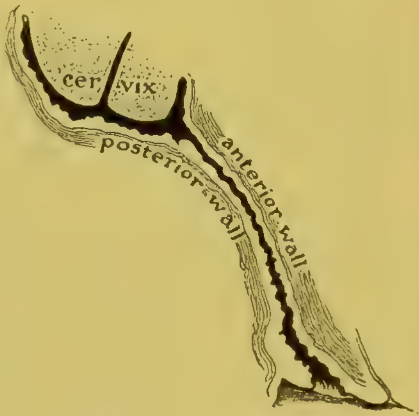


FIG. 55.—Length of vagina, less in front than behind.

Fig. 55 shows the comparative length of the vagina in front and behind.

The vagina is attached above to the cervix, about midway between the body of the uterus and the termination of the cervix uteri. Below, it unites with the floor of the pelvis and the structures which form the vulva. Anteriorly, it is united to the bladder and urethra; to the former loosely, and to the latter so firmly that it is almost impossible to separate these structures even by dissection. Posteriorly, the vagina and rectum are united and form the recto-vaginal septum. Below, they are separated by the sphincter-ani and tranversus-perinei muscles and cellular tissue. Fig. 56 shows the triangle formed by the bifurcation of the two canals and the divided muscles between them.

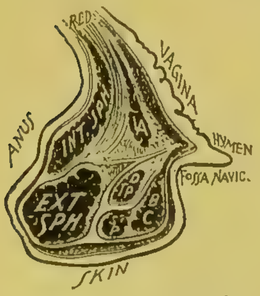


FIG. 56.—Triangular shape of perineal body.

The vesico-vaginal septum is the most resistant portion of the vaginal walls, and, when put upon the stretch, feels like a cord lying beneath the mucous layer; this is called the anterior column of the vagina.

The vaginal walls are composed of three coats—an external, middle, and internal; the external consists of fibrous, elastic, and areolar tissue: the middle of unstriped muscular fiber; and the internal of mucous membrane. The muscular coat is continuous with the middle coat of the uterus, and the two are alike in structure, and in the fact that they both undergo extraordinary hypertrophy during utero-gestation. The mucous membrane of the vagina is continuous with the endometrium, but differs from the latter in structure to a marked extent. It is arranged in transverse folds, which are most prominent anteriorly, and is studded with papillæ and covered with pavement epithelium. In general structure the mucous membrane of the vagina resembles very much the skin. This is noticeable in cases of prolapsus, in which the membrane, by being exposed, becomes dry and its epithelium hardened.

The structure of this membrane is like the skin to some extent—its secretion is serous and of acid reaction. There has been some discussion among anatomists regarding the presence or absence of muciparous glands in this vaginal membrane. The fact is that they are abundant in the lower third, but nearly absent in the middle and upper thirds.

The vagina is developed like the uterus, from Müller's ducts, and is liable to malformations from arrest or defects of development.

Malformations of the Vagina.—Imperforate hymen has been already discussed under the head of menstrual disorders due to malformations of the sexual organs generally.

Double vagina usually occurs in connection with double uterus, and in such cases no harm to the patient is likely to result.

Perpetuation of the septum between the most dependent portions of Müller's ducts has been found. In one patient who came under my observation a thick septum extended from just within the hymen upward about an inch and three quarters. This malformation gave rise to no symptoms, and was not recognized until the birth of her first child, when the attending physician found that it caused some obstruction to delivery. I examined the case about two months after her confinement and found this septum, about a quarter of an inch thick and quite resistant. It was divided by two incisions parallel to the axis of the vagina, and about three quarters of an inch apart. The strip thus removed was not the whole of the septum, but it was sufficient, as the ends remained contracted. The divided edges were brought together with sutures, and healing took place very promptly.

Imperforate Vagina.—Absence of the vagina has been described as one of the malformations, but it is doubtful if there is not in these cases a rudiment of vagina, which is imperforate, and hence absent to all intents and purposes. In the most complete case of the kind that I have seen the rectum and bladder were near together. With the finger in the rectum, and a large sound in the bladder, a rather dense cord running upward from the vulva could be felt. The uterus was also rudimentary, and although the patient had passed the period of puberty, and had the outward characteristics of her sex, she had never menstruated. This was evident from the absence of menstrual flow in the uterus and Fallopian tubes.

In cases like this nothing can be gained by treatment. So long as there is no excessive menstrual molimen, which would endanger the life of the patient, there should be no interference.

Atresia of the Vagina.—This is the more common affection. It may be either complete or partial, congenital or acquired.

In the congenital form the atresia may extend the whole length of the vagina, and that condition is generally associated with an undeveloped uterus. The incomplete, or partial, atresia is usually at the lower third, but it may occur at the upper or middle portion of the vagina.

Congenital atresia occurs under two different conditions. The one is associated with defective development of the uterus or ovaries, or both, sufficient to prevent menstruation altogether. In the other, menstruation takes place, but the flow being obstructed, accumulation occurs in the uterus and sometimes in the Fallopian tubes. These differing conditions require different management. I will therefore consider them separately.

Atresia of the vagina, with defective development of the uterus and ovaries, is only of interest with reference to the diagnosis. Nothing can be done, nor is there any active demand for treatment. The patient does not suffer, as a rule, except from the consciousness of her deformity, which would only cause mental distress in case she intended to get married.

Two such cases have come under my observation. The most typical one was of a good family, strong, but inclined to flesh. She did not change much in general appearance at puberty, but maintained considerable of the masculine type. She never showed the slightest disposition to menstruate. She was asked by a worthy man to marry, but she was afraid to do so without advice, knowing that she was "unlike other women." She sought advice, and on examination there was found atresia of the vagina, and apparently the uterus and ovaries were rudimentary. Nothing could be done to help her. She took up nursing as a profession, and has succeeded remarkably well. This case is briefly given in order that this variety may be contrasted with the next form.

Atresia associated with fully developed uterus and ovaries may be complete or incomplete. Usually, there is no notice taken of the deformity until puberty arrives, unless the attention of the mother or physician is directed to the pelvic organs for some other reason. There are no symptoms until puberty. Then the patient, after having undergone the changes characteristic of the period, has all the symptoms of menstruation without the flow.

The symptoms, or menstrual molimen, as they are called in their totality, are more marked than in normal menstruation, and great pain, fullness, and tenesmus, come on during the period. The first effort at menstruation is not usually attended with such severe suffering, but each succeeding period is worse, and very soon the evidences of the accumulated fluid become tangible.

Physical Signs.—Inspection of the parts shows a complete closure of the vulva. Combined touch with a straight sound in the bladder and a finger in the rectum, reveals the fact that in absence of the vagina the rectal and vesical walls come together, and are thin and elastic. If the vagina is present, but closed, it is felt between the sound and finger as a firm cord. When the uterus is distended with menstrual fluid, the accumulation causes a tumor, which is elastic and obscurely fluctuating. The signs of partial atresia differ according to the location of the occlusion. When the atresia is in the upper third of the vagina the lower portion of the canal ends in a *cul-de-sac*. If the atresia is at the lower third, the obstruction is found below, and, by means of the sound in the bladder and the finger in the rectum, the upper portion of the vagina is found distended with menstrual fluid.

Causation.—Congenital atresia is produced by some arrest of development or disease during embryonic life. When it is acquired between birth and puberty, it is usually due to acute inflammation occurring in connection with some constitutional disease, such as scarlatina, diphtheria, or measles.

Gangrenous vulvitis and vaginitis, which may occur in the course of any of the above-named diseases, may also terminate in atresia. I have seen two cases of partial atresia, caused by some acute inflammation during the course of typhoid fever, occurring near the period of puberty.

In the cases which have been acquired after puberty and child-bearing, one was a soldier's wife, who was confined of her first child at a military post on the frontier. Her labor was of three days' duration, and she was finally delivered by craniotomy; there was subsequent sloughing of the vaginal walls, and consequent atresia.

Another case of partial atresia was caused by amputation of the cervix for cancer. There was at the time of the operation deep cauterization of the vaginal walls, which resulted in atresia. One other case was caused by the accidental use of pure carbolic acid, as a vaginal injection. In this case the adhesions of the vaginal walls were not very firm, and the canal was restored by operation, but there was much trouble experienced in preventing the recurrence of the atresia—a constant tendency to which remained.

Prognosis.—In complete atresia there is great difficulty in the operation for its relief, and a constant tendency to contraction of the parts; hence, the hope of complete recovery is, to say the least, very limited.

Treatment.—The indications are to restore the vagina by surgical means. This is a difficult procedure, and one that is not very successful in all cases. The difficulties in the operation, and the ultimate success, depend upon whether the atresia is partial or complete. If the portion of the vagina which is closed is limited to a third of the whole canal, reasonable hope of success may be entertained, but I doubt if the vagina was ever fully restored and maintained when complete atresia existed.

When there is associated with the atresia imperfect development of the uterus and ovaries, and there is no tendency to menstruation, treatment is not indicated. Such malformed subjects often live quite comfortable and useful lives.

There is another class of cases, already referred to in treating of absence of the menstrual function, in which the uterus and vagina are rudimentary, but the ovaries are well developed. In these there is a recurring menstrual molimen, and the general nervous system may become greatly deranged. Ovaro-epilepsy may occur under these conditions. The removal of the ovaries might become necessary in such cases in order to arrest the inclination to menstruation, and relieve the constitutional disturbance caused by such unsuccessful efforts.

The following is a description of Dupuytren's operation for atresia of the vagina, as described by Courty, with the modifications which M. Puesch has added, which I quote from the work of Dr. Thomas:

"After having arranged the woman in a convenient position, the bladder is emptied by means of a male catheter, which is given to an assistant, who holds it turned upward. It is not removed during the operation, except where the obliquity of the part would render it troublesome. The index-finger of the left hand is then carried into the intestine as far as possible, in order to serve as a guide for the bistoury and at the same time as a protection to the rectum. After these preliminary steps the operator, placed between the thighs of the patient, makes a transverse incision at the center of the obstacle, or in the vulvar orifice, if the vagina is completely wanting; if the cellular tissue is lax, he can tear with his finger, the sound, or the handle of the bistoury the vesical and rectal walls till he reaches the tumor; if it is tense or too resistant, the surgeon dissects by gentle efforts, separating the tissues with the handle or the finger rather than cutting them, and, if it be necessary, breaking them down at the edges with a button bistoury. In each case he proceeds slowly and carefully, stopping from time to time to examine with the finger and be certain at what distance those organs are situated which it is necessary to avoid. When the canal which has been reopened will admit the index-finger easily, and when a more distinct perception of fluctuation announces the proximity of the sanguineous collection, the operator is warranted in plunging a trocar into this, and the pouring out of a sirupy, brown liquid, like the lees of wine, will show that the end has been reached. The pressure upon the uterus is then stopped, a large part of the fluid is allowed to flow away through the canula, and then, substituting for this instrument a perforated sound, the operator increases the size of the opening by numerous incisions upon its sides, and thus renders certain the final result. Afterward he carries a gum-elastic sound into the uterine cavity, and throws through this, but with very little force, several injections of warm water. The dressing having been finished, the parts are sponged and dried, and the patient is placed in bed, protected with cloths, so as to prevent the bedding from being soiled by the mucous and sanguinolent discharges which flow during the first days."

To keep the canal open after this operation is exceedingly difficult; all surgeons testify to this fact. Many things have been tried to accomplish this object, but the best is the glass plug or dilator of Sims (Fig. 57). In one case—the case of acquired atresia referred to under the head of causation—I found that the glass instrument caused much pain, and I used elm-bark cut in fine strips, made into a roll of suitable size, and moistened with carbolized water. This was removed daily, and, as it expanded after being introduced, it answered in that case very well.

The tendency in all these cases is to contraction and return of the atresia; in fact, I have never seen a case of complete atresia permanently cured. In view of all these, I have been guided in practice by the valuable suggestions of West. The following is from his work on "Diseases of Women," page 34:

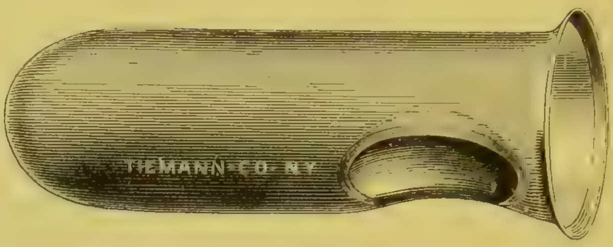


FIG. 57.—Sims's vaginal dilator.

"The operation for atresia is performed by the bistoury or guarded bistoury, or Pouteau's trocar. The bistoury is to be generally preferred. Pouteau's trocar is resorted to when a considerable part of the lower vagina is absent, and the sac is punctured sometimes pretty high up per rectum. This operation is in such cases preferable to vain, painful, and dangerous attempts to bore the thin tissues between the urethra and rectum to make and maintain a new vagina. Such a proceeding results only in vexation. It is far better for the malformed woman to discourage all hopes of maternity. The artificial passage into the rectum is easily kept open, and the menstrual fluid runs off through it."

INFLAMMATORY AFFECTIONS OF THE VAGINA.

Vaginitis.—The vagina is seldom if ever affected with idiopathic inflammation; vaginitis, therefore, always occurs as the result of some specific cause, or is secondary to some contiguous inflammation, such as endometritis. There are several varieties of vaginitis. Classified according to the intensity and duration of the affection, there are the acute and chronic forms; when classified according to the causation, there is a number of forms, the most important of which are gonorrhœal, erythematous, sometimes called erysipelatous, and diphtheritic. As a rule, the inflammation is general, involving the whole canal; occasionally it is circumscribed, and then it is found just within the vulva, or else at the upper part.

Pathology.—Owing to the anatomical peculiarities of the vagina it is not susceptible of the catarrhal form of inflammation, so common to mucous membranes elsewhere. From the fact that the vaginal mucous membrane resembles in structure the skin, and that there are few mucous follicles found in it, vaginitis, in its pathology, is more like dermatitis than like the ordinary inflammations of mucous membranes. Congestion, transudation of serum, premature exfoliation of the epithelium, and, in well-defined cases, the formation of pus, are the characteristic results of acute vaginitis.

In the subacute form there is less congestion and less pus, otherwise the inflammatory lesions are the same. This may all be more briefly stated in another form, as follows: Vaginitis occurs either as erythematous, purulent, or exudative—never as purely catarrhal.

The morbid appearances in these forms differ. Erythematous vaginitis is characterized by great capillary congestion, which gives the intense redness of this form of inflammation in the first stage. Then, as the disease advances, there is exfoliation of the epithelium. Sometimes the epithelium comes off in thin flakes, resembling in this respect the exfoliation of the cuticle in dermatitis. This leaves the mucous membrane denuded of its epithelium, and gives a glazed appearance to the whole canal. During this time there may be a free serous secretion and some pus found, but these are not profuse in all cases.

In purulent vaginitis the lesions are the same as already described. In the exudative forms the characteristic lesions are present; the diphtheritic membrane as in diphtheria, the croupous in that form of inflammation.

There are other forms of vaginitis mentioned by some authors, but they are peculiar in regard to causation, while in their pathology they do not differ materially from those described.

Symptomatology.—The symptoms in the acute form are a feeling of internal heat and fullness. These increase in intensity, and pain in the vagina and uterus come on. Vesical and rectal tenesmus are present in severe cases, and urination and defecation are painful. The urine causes violent smarting of the inflamed parts about the vulva with which it comes in contact. So severe is the pain in some cases during and after urination, that the patient resists the inclination until the power of evacuation is lost, and there is retention.

There are constitutional disturbances also. At first there is fever, and following that loss of appetite and debility. The discharge is profuse, and sero-purulent in character; it causes excoriation of the external parts, which often extends to the limbs. If great cleanliness is not observed, the discharge decomposes and causes a very disagreeable odor.

In the subacute and chronic forms of vaginitis the symptoms are the same in character, but less in degree; in fact, the annoying discharge is the only symptom observed in many of these mild cases.

Physical Signs.—By inspection of the parts when the labia are separated the characteristic discharge can be seen and recognized. It differs from that of vulvitis in being less tenacious. The mucous glands about the vulva give to the discharge of vulvitis a cohesiveness which is not found in that of vaginitis. The use of Sims's speculum will show the inflamed appearance of the membrane and the discharge which is present.

The anterior and lateral portions only of the walls of the vagina are seen through the Sims speculum, but by watching the folding together of the posterior and anterior walls, as the speculum is withdrawn, the whole canal can be thoroughly inspected.

The difference between the signs of acute and sub-acute inflammation is simply in the intensity of the congestion, the extent of the canal involved, and the quantity and character of the discharge.

To distinguish gonorrhœal vaginitis from the non-specific forms the microscope alone is sufficient. When there is a question regarding the nature or the cause, specimens of the discharge should be examined for the gonococci.

Causation.—There is a predisposition to vaginitis in those of delicate health and strumous diathesis, but it is not marked.

Judging from my own observations, the common causes of vaginitis are gonorrhœal virus, metritis, especially puerperal, and erythematous affections. This applies to the acute form of the affection.

Sub-acute and chronic vaginitis may be caused by any inflammation in the neighborhood of the canal. Dysentery, for example, causes vaginitis not infrequently. Different fungi have been credited with causing vaginitis, but this is not well settled. When it occurs in connection with the eruptive diseases the cause is, of course, the specific morbid material which produces the constitutional disease.

Prognosis.—With proper care vaginitis can be arrested and recovery secured without any permanent lesions. It is liable to recur if caused by gonorrhœa.

Sometimes permanent damage is done to the canal when the vaginitis is due to any of the eruptive diseases or diphtheria.

Treatment.—In the past, treatment of vaginitis has consisted mainly of the frequent use of medicinal douches. The agents used, and the means and ways of using them, have varied greatly with different practitioners. Very recently a new method of treatment has been brought to the notice of the profession by Dr. Engelmann, of St. Louis. His method he terms the dry treatment, which consists in the use of medicinal powders and medicated tampons. A number of years ago I tried this method, in an imperfect and limited way, in the treatment of vaginitis among the insane, and obtained experience enough to know that it is of great value. I find even now, however, that while using certain agents in powdered form, and also the tampon, the discharge from the inflammation and the powder used lodge in the folds of the mucous membrane, and that it is necessary to use a vaginal douche occasionally in order to make the treatment effective.

In acute vaginitis I employ what may be called a mixed treatment, using the medicinal agents and powder with tampon, and occasionally employing the douche in the following way: After cleansing the mucous membrane thoroughly with a douche of warm water and borax, a drachm to the quart, I then thoroughly apply subnitrate of bismuth and prepared chalk, equal parts, and introduce a tampon of borated cotton, the tampon being so arranged as to thoroughly keep the vaginal walls apart; at the end of twenty-four hours the tampon is removed, and any accumulation of the discharge and powder is thoroughly removed and the tampon replaced. At the end of the next twenty-four hours the tampon is removed and the douche of borax and water employed, and the dry treatment repeated.

In acute cases where there is much pain, and especially if due to specific cause, I employ iodoform in place of the bismuth. If the trouble does not yield promptly to this treatment I give up the dry dressing, and every third day apply to the entire canal, by means of the atomizer with strong pressure, a solution of nitrate of silver, one grain to the ounce, or sulphate of zinc, one half grain to the ounce. I find that such mild solutions, applied with considerable force with the atomizer, diffuse the application very thoroughly, and produce a far more marked effect than much stronger solutions used as a douche.

The method of application or spraying the canal is as follows: A Sims's speculum is introduced, and when the canal is distended by pressure, the spray is thoroughly applied to the upper portion of the canal and to the anterior and lateral walls, and the posterior wall is sprayed as the speculum is gradually withdrawn. In the intervening days between these applications I employ daily, or twice a day, a vaginal douche of a solution of sulphate of zinc, sixty grains to the quart of warm water.

In cases that can not be so carefully watched and treated, I rely almost wholly upon the sulphate-of-zinc solution, used as a vaginal douche twice a day at first, and subsequently once a day. This answers remarkably well in a great majority of cases, but there is a constant liability to miss a portion of the canal, especially the upper and posterior fornix. To overcome this, an application of the nitrate of silver or sulphate of zinc is to be made to these neglected parts once or twice a week through the speculum.

This simple treatment is usually sufficient in all ordinary cases, but whenever the disease is specific in its origin, and is complicated with urethritis and endometritis, then these affections should be treated simultaneously in the ordinary way.

If treatment is neglected or discontinued too soon, the vaginitis will recur in a very short time.

Vaginismus.—Since the time when Sims first described this affection and its treatment it has been considered by most writers as a distinct affection, and is usually classed as a neurosis of the vagina or hymen. In all the cases which have come under my observation the trouble has been due either to some affection of the muscles of the pelvic floor, or to a hyperæsthesia of the mucous membrane of the vagina. The former will be spoken of in connection with injuries of the pelvic floor.

Hyperæsthesia due to affections of the other pelvic organs, I have always looked upon as a symptom of the preceding disease of the uterus, rectum, or bladder. Viewing the subject from this standpoint, little need be said about it in this connection. The removal of the affections which give rise to it is the chief indication, and is generally sufficient in the way of treatment. It may be mistaken for anal fissure, urethral caruncle, or vaginitis.

Occasionally, it is necessary to give relief while the treatment is being employed to remove the cause; and, in those cases in which the cause can not be removed, efforts should be made to relieve the hyperæsthesia. This can usually be done by the judicious use of cocaine.

Neoplasms of the Vagina.—Many of the neoplasms of the vagina are the same in character as those found elsewhere; as, for example, sarcoma, carcinoma, fibroma, and lipoma. All these are very rare.

The diagnosis and treatment of these neoplasms are based upon the same principles as those which guide the practitioner in dealing with such affections when located in other parts of the body.

I will, however, give a brief account of some of the more common neoplasms of the vagina:

CYSTS OF THE VAGINA.—These vary in size from that of a buckshot to that of a child's head—one case, at least, being on record, in which the tumor was of the latter size, and so seriously interfered with labor as to necessitate the evacuation of its contents before the labor could proceed. Nélaton reported a case in which, on analysis, the cyst contents were found to be made up of water, eighteen parts; albumen, one part and a half; and salts, a half part. Microscopical examination has shown the presence of epithelium, pus, cholesterine, nucleated and lymphoid cells in these cysts. Occasionally blood and pus are found in the contents.

Winckel, who has examined these cysts with great care, states that their walls are made up as follows: The external surface is covered with the ordinary pavement epithelium of the vagina; the thickness of the walls varies between one twenty-fifth and two fifths of an inch—the thinnest portion being formed of connective tissue alone, the thicker with the addition of smooth muscular fibers. The internal surface is usually perfectly smooth, but may show papillæ covered with epithelium, which in the majority of cases is cylindrical, more rarely simple, or stratified pavement epithelium, or, still more rarely, stratified pavement and cylindrical epithelium in the same cyst.

These cysts of the vagina are caused in some cases by a closing and subsequent distention of the vaginal glands. They may also be due to dilated lymph-vessels, to œdema, and to the accumulation of blood after an injury. Cysts most frequently have their origin in distended Gärtner's ducts. This has been clearly pointed out by Amand Routh in his most interesting article in Volume XXXV of the "Transactions of the Obstetrical Society of London." Their recognition is not difficult, provided that a careful inspection is made of the vaginal canal. Their treatment is exceedingly simple. It consists in emptying them by an incision through their walls. To prevent refilling, the cyst wall should be removed if possible, and the wound closed. If that is not possible, the portion of the cyst wall left should be destroyed with cautery or caustic, and the cavity packed with gauze to cause healing by granulation.

The following case, illustrative of this form of vaginal cyst, I quote from Dr. Routh's article:

"Miss C. C., aged twenty-five, first saw me in 1889 for coccygodynia and bearing down, due to pelvic congestion. She improved rapidly, but over-walked herself in January, 1890, and for a few weeks suffered as before. Two years and a half afterward—November, 1892—she consulted me again for pain over the right ovarian region, and a profuse yellow watery discharge, which was occasionally offensive. Walking caused great pain down the right leg and in the right side. The abdomen was somewhat distended, and the muscles resistent over the right half of the abdomen. *Per vaginam* the uterus was mobile, but pushed over to the left by a somewhat elastic mass on the right side of the pelvis, situated apparently between the layers of the broad ligament. Bimanually this mass could be felt to be partly mobile, elastic, tender, and separate from the uterus, which by means of the sound could be moved to some extent independently of the broad-ligament tumor.

"In the vaginal wall, running from the base of the right broad ligament, starting from a spot slightly to the right side of the cervix, there was an elastic ridge, somewhat irregular in outline, which passed forward and toward the middle line, becoming lost a little to the right of the urethra, about three quarters of an inch behind the base of the vestibule. I could not find out where the discharge came from, though I noticed that the upper part of the vagina was free from discharge, while the vulvar orifice was always moist, and soiled by a somewhat viscid, yellowish, offensive secretion.

"A fortnight later the patient suffered severe throbbing pain, and the temperature rose nightly to 101° or 102° F. The vaginal ridge had then become larger, tenser, and more elastic, and evidently contained fluid reaching very nearly to the vaginal outlet in the middle line of the vaginal roof.

"In a few days the portion of the vaginal cyst near the cervix was found to be more swollen, being about the size of a thumb, but the rest of the vaginal ridge seemed to consist of several cysts, apparently intercommunicating. There seemed also to be definite communication between the vaginal cyst and the broad-ligament tumor, from the fact that pressure upon the vaginal cyst caused its contents to pass backward, while straining or coughing immediately refilled it.

"The patient went into a nursing home, and was examined under ether. The vaginal cyst was then found to be collapsed along its whole length; the broad-ligament tumor was very distinctly made out, and was thought to be a broad-ligament parovarian cyst, the vaginal cyst being presumably a patent Gärtner's duct communicating with the cyst cavity. At the end of the examination, as the patient was regaining consciousness, she coughed, and bore strongly down, causing a quantity of yellowish offensive pus to come out of a minute hole not previously seen, just beneath and to the right of the urethral orifice at the base of the vestibule. A small probe passed down this abnormal orifice for three quarters of an inch, and the passage was laid open as a rectal fistula would be. The openings of Skene's ducts just within the urethral orifice were quite perceptible.

"I then opened the main vaginal cyst about two inches up the vagina, but was not able to pass a probe for any distance either backward or forward.

"Offensive pus continued for some days to come away from both of these places, but mainly from the anterior orifice; indeed, I do not think I really opened the main cyst posteriorly on the first occasion. A few days later I succeeded in passing a probe along the whole canal from the anterior orifice, and subsequently a director; and, under ether, freely laid open the vaginal cyst by means of a Paquelin's cautery knife, letting out much pus, which welled freely out of the upper end of the incision at the base of the broad ligament.

"The duct thus laid open was lined by smooth membrane, but no microscopic examination was made.

"A sound passed into this upper opening near the cervix went a distance of five inches upward and outward, and was evidently inside a cyst cavity in the broad ligament.

"The opening was enlarged to admit the finger, which could be passed into the cyst behind the vagina, and could make out that the lining membrane was smooth, and that the cyst was between the layers of the broad ligament. *Per rectum* the examining finger passed well behind the cyst cavity, and could then detect a sound passed into the parovarian cyst from the vagina. The cavity was washed out with iodized water, and a drainage tube inserted.

"For nearly five weeks the purulent fluid continued to come away, speedily losing its offensive odor and becoming daily more watery, and at the upper end the sides of the vaginal cyst tended to unite again over the drainage tube, which was gradually shortened and finally removed, leaving a canal in the vaginal wall about an inch long (March, 1893) on the right side of the cervix.

"November 7, 1893.—A rut or trough is to be felt in the vaginal wall to the right of the vaginal portion, leading into a short canal an inch long. The canal now only admits a large sound, and ends in a *cul-de-sac*. It is lined by a bright red membrane. The uterus lies in its central position, and nothing abnormal can be felt in the right broad-ligament region. The patient feels perfectly well.

"This is believed to have been a case of distended Gärtner's duct, where the contents finally suppurated. It is probable that at first the vaginal part of the duct was impervious, but had become gradually opened up by the pressure of the contents of the distended portion in the broad ligament where the pain first began."

Dr. Routh has been able to find but two other cases of associated broad-ligament and vaginal cyst, one described by Watts in 1881, and a second by Veit in 1882. These are as follows:

"Watts's patient had a vaginal cyst which bulged from the anterior vaginal wall in the position of a urethrocele. The urethra was, however, quite normal.

"He laid open the cyst *per vaginam*, and to his surprise was able to pass a probe several inches without the slightest resistance. The probe passed to the patient's left side, and its tip was easily felt at a point midway between the umbilicus and the left anterior superior iliac spine. Watts thought this probe had penetrated to the peritoneal cavity, but I think it pretty clear that, as in my case, it was really between the layers of the broad ligament, where there was almost certainly some distention of the duct not noticed at the time, as it doubtless speedily collapsed when the vaginal cyst was opened.

"Veit's case (1882) was that of a married multipara, aged forty-seven, who had a large vaginal cyst, which made micturition difficult, owing to pressure upon the urethra. The cyst bulged out between the labia majora as large as a child's head.

"The uterus was pushed over to the left by a tense elastic swelling in the right broad ligament, which clearly communicated freely with the vaginal cyst.

"The case was treated by incision of the vaginal cyst, draining both it and the broad-ligament cyst, and by cutting out a large piece of the lining membrane of the vaginal cyst to prevent reclosure. Cholesterine crystals were found in the fluid. The epithelium was flattened in type.

"The finger could be passed into the broad-ligament cyst, and the ovary could be felt on its posterior and outer surface."

FIBROMA, MYOMA, AND FIBROMYOMA.—These growths occur but rarely. Like the cysts of which I have already spoken, they vary very much in size; some being so small as only to be recognized by the most careful examination, while others may be so large as to interfere seriously with micturition or defecation, or even to so diminish the caliber of the pelvic canal in pregnant women as to prevent the delivery of the child through the natural passage, and to necessitate laparotomy. These tumors are readily recognized by their density. If there is any doubt in the mind of the practitioner, an aspirating needle will at once exclude a cyst or an abscess. If the tumor attains any considerable size so as to interfere with any of the functions it should be removed; or if, though small, it is increasing in size, this would constitute sufficient indication for its removal. This may be done by Paquelin's cautery, if the tumor is sufficiently pedunculated, or if not, it may be enucleated.

SARCOMA.—This is so rare as to need but the simple mention. Its treatment should, of course, be prompt removal as soon as recognized.

CARCINOMA.—All that I think it necessary to say on this subject has been said in the chapter on Cancer of the Uterus, to which the reader is referred.

CHAPTER VII.

INJURIES TO THE PELVIC FLOOR FROM PARTURITION AND OTHER CAUSES.

In order to comprehend fully the nature of the injuries to the pelvic floor and their varied and important pathological relations, it is necessary to review briefly the anatomy and physiology of this structure.

The pelvic floor, which is also known by the somewhat indefinite name of perinæum, comprises the tissues which together occupy the space between the bones of the pelvic outlet. It is composed of muscles, fascia, areolar and elastic tissues. The muscles, which are the chief element in the structure and perform its function, have their origin from the ischium, the pubes, and the coccyx. From these points they extend downward, inward, and backward to the median line, and are united to the terminal ends of the rectum and vagina and to each other from the opposite sides.

The levator-ani muscle arises from three points: the first section from the posterior surface of the os pubis on each side of the symphysis, the third section from the spine of the ischium, and the second or middle portion from the tendinous arc swinging between these two points, this thickening of the obturator fascia being called the "white line." The three parts converge to be inserted into the coccyx, or the recto-coccygeal raphé, though a few fibers are given off to the vagina, perineal body, and sphincter ani. The general course of the muscle is backward in a nearly horizontal direction. It is lined by the anal or levator fascia beneath, while above it is attached to the strong recto-vesical fascia. According to Dr. W. W. Browning (Medical News, June 12, 1897) the first part also has its origin from the posterior layer of the triangular ligament, where it blends with the obturator fascia along the descending pubic ramus. Fig. 58 shows the position and attachment of this muscle.

The transversus-perinæi muscle arises from the ramus of the ischium, and passes across to the median line, where it joins its fellow of the opposite side. The coccygeus arises from the spine of the ischium, and is inserted into the side of the lower part of the sacrum and side and front of the coccyx. It is understood, of course, that there are two of each of the muscles thus far described, one on each side. The bulbo-cavernosus muscle can be most easily traced by taking as its origin the space between the sphincter ani and the orifice of the vagina. From this point its two halves pass upward, one on each side of the vagina. The upper anterior end of each slip of muscle divides into three parts, which are inserted as follows: One into the lower surface of the corpus cavernosum of the clitoris, a

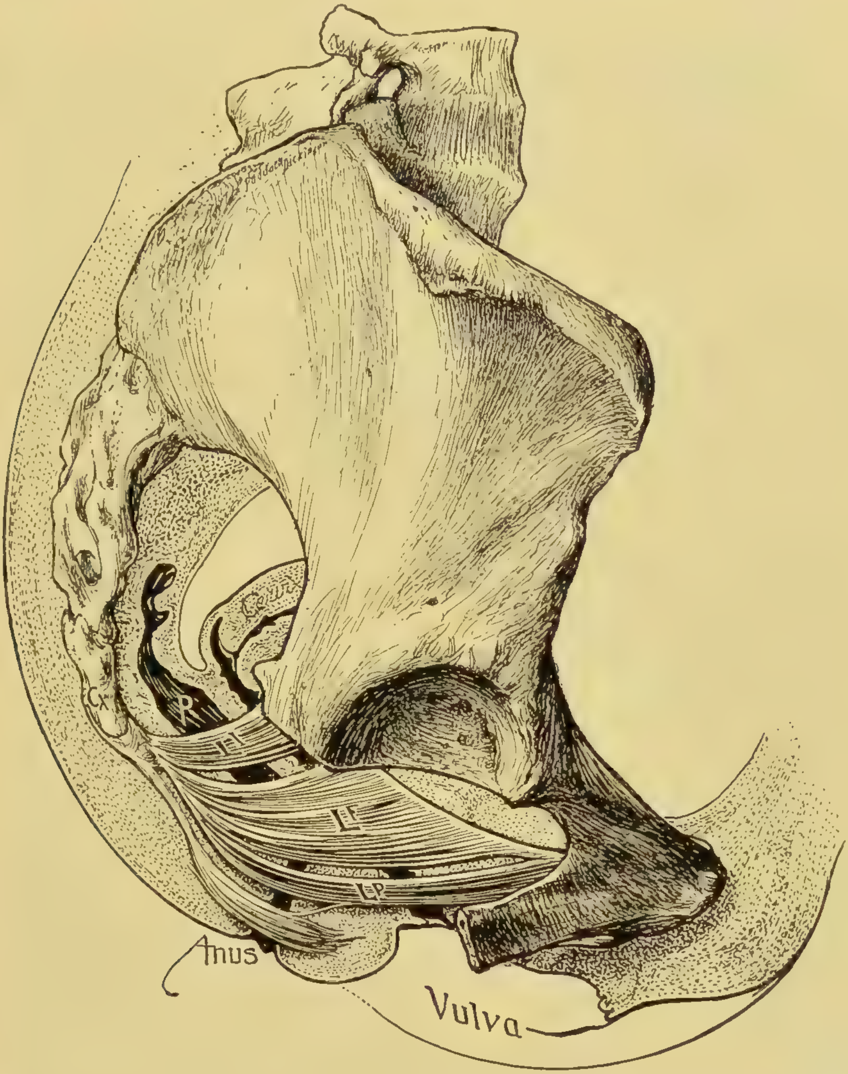


Fig. 58.—The levator ani, seen from the right after removal of much of the ischium. Lp, first section arising from the rear of the pubes; Lf, second part arising from the fascia, or white line; Li, third, or ischial portion. The sphincter surrounds the anus, and is attached to the coccyx.

second into the posterior portion of the bulb, and the third unites with its fellow of the opposite side in the mucous membrane of the vestibule; and all of them are, through the medium of tendon and fascia, connected to the pubic bones. If this muscle is traced from above downward to the center of the pelvic floor, it will be seen to

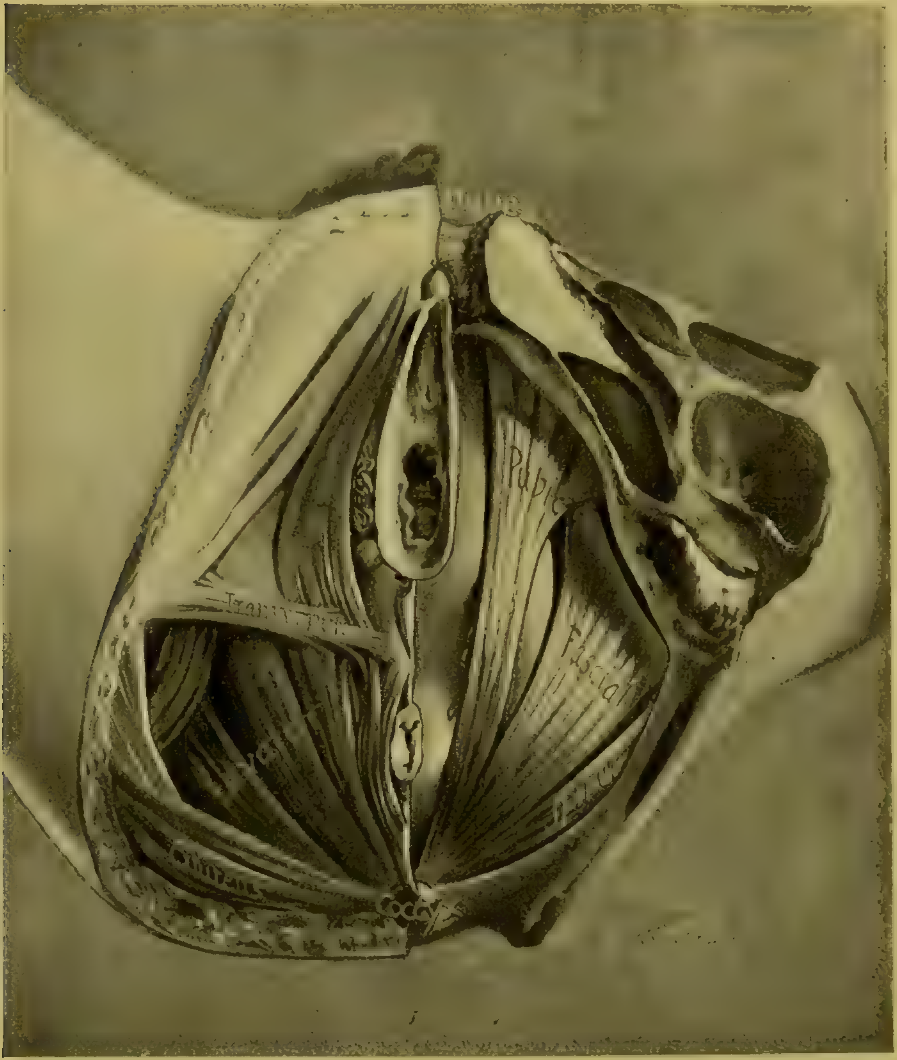


FIG. 59.—The muscles of the pelvic floor; on one side the superficial muscles, on the other the three parts of the levator (semi-diagrammatic). The ischio-rectal fascia is shown beyond the muscle.

have an origin and insertion like that of the anterior fibers of the levator ani; hence the bulbo-cavernosus and levator ani may be considered as one muscle. This view is justifiable from the fact that they also contract together, having a similar function.

The sphincter-ani muscle, which has a function peculiarly its own, is closely united to all the other muscles of the pelvic floor by an interlacing of the muscular fibers and by tendinous and fascial attachments. This muscle arises from the end of the coccyx, and divides to surround the end of the rectum, while its deeper fibers are inserted in the tendinous raphé in the median line between the rectum and vagina. The superficial fibers of this muscle are circular, and attached to the integument.

Taking the muscles of the pelvic floor in the aggregate, they form one complete diaphragm of muscular tissue which fills the pelvic outlet. By this arrangement the rectum and vagina are held in position, and their terminal ends controlled in the performace of their functions. The muscular attachment of the muscles and vagina is in part shown by the preceding figures, 58 and 59.

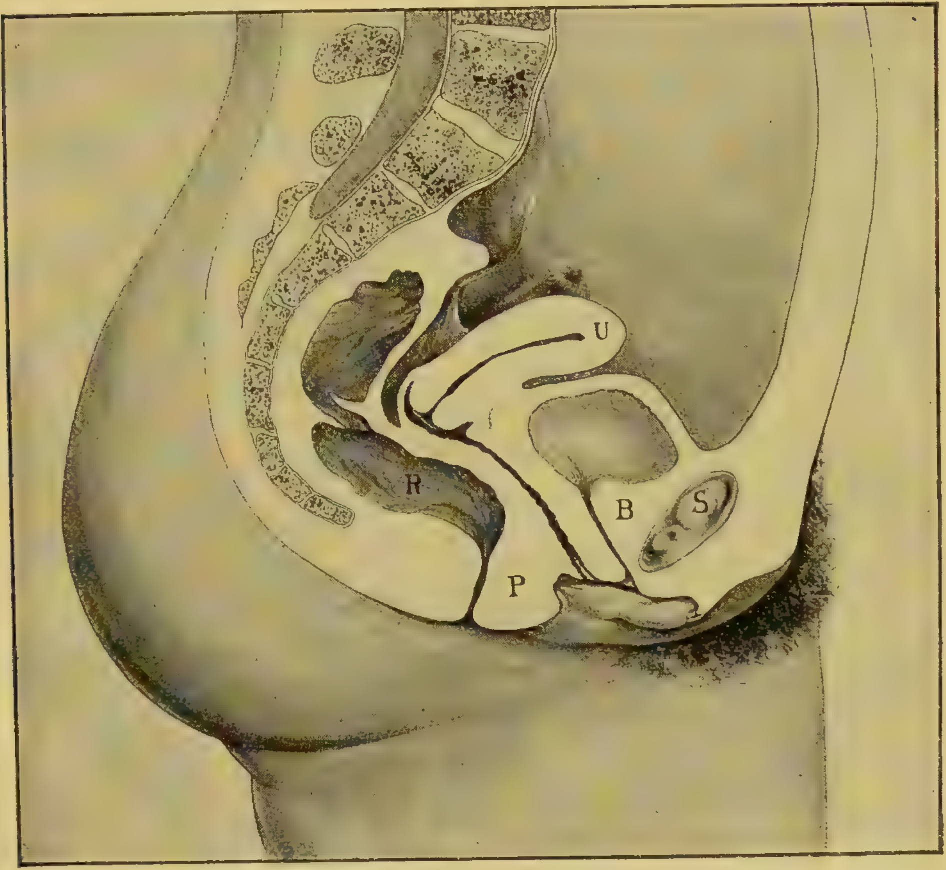


FIG. 60.—Diagrammatic sagittal section of the female pelvis. U, uterus; R, rectum; S, symphysis; P, perineal body; B, is beneath bladder. This is the position of the uterus when the bladder is moderately full.

The normal elevation of the pelvic floor is illustrated by Fig. 60.

This position of the pelvic floor and the relations of the rectum and vagina should be noted because they become changed in most of the injuries of this structure.

The muscles of the pelvic floor are surrounded by the deep and superficial fascia, which in some parts becomes ligamentous in character; for example, the ischio-perineal ligament—that dense portion of the fascia which stretches from one side to the other through the space between the rectum and vagina. This fascial structure accompanying the muscles is characteristic of all muscular structures which have to afford continuous sustaining power, like the muscles of the back, of the neck, abdomen, and thigh.

Function.—These anatomical facts regarding the floor of the pelvis suggest that its functions are to sustain the rectum and vagina, and to aid in their functions. The arrangement of the muscles is such that they close by sphincteric action the terminal ends of the rectum and vagina, yet also permit the distention of their orifices during the acts of parturition and evacuation of the rectum. When pressure is made downward by any body in the rectum or vagina, the levator muscles act to draw the orifices of these canals upward, and hence supply a resisting force to the downward pressure which effects dilatation of the vagina and rectum. This action of the muscles in resisting downward pressure is well demonstrated during parturition. When the child's head presses upon the floor of the pelvis, the muscles, by retraction, distend the sphincter ani to a great extent. The dilatation of the vagina is produced by a more passive giving way to the forces above, and yet the muscles exert a well-defined power in retracting that portion of the pelvic floor. This function of the muscles should be noted because it enters into the mechanism of most of the injuries to be discussed. Regarded as a mechanical structure, the pelvic floor resembles a diaphragm composed of muscles and fascia which close the pelvic outlet. Its borders are attached to the bony walls of the pelvis, and it is held at its proper elevation by strong fascia and the levator-ani muscle. Its mechanism is based upon the principles of the suspension bridge, the anchorage being represented by the pelvic bones, the floor representing the bridge and the levator-ani muscle with the powerful fascial layers corresponding to the sustaining cables (see Fig. 61).

This brief statement regarding the function of the pelvic floor embodies the essential points in its chief offices. There remains something to be said regarding its relations to the pelvic organs.

Up to the present time the attention given to this subject by gynecologists has been almost wholly confined to laceration of the so-called perineal body—an injury frequently seen, but not by any means the only one that occurs to these parts. This concentration of attention on one portion of the subject has given rise to great diversity of opinions regarding the function of the perinæum and its relations to the displacements of the pelvic organs, one party to the controversy believing that the perineal body has much to do with sustaining the pelvic organs in position, the other holding that it has very little power in this respect. Without summing up at great length the arguments on both sides, the facts bearing on the practical side of the subject may be briefly stated.

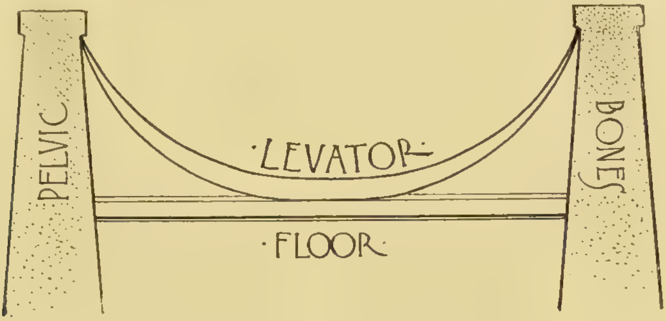


FIG. 61.

In all injuries of the pelvic floor which impair its supporting function to any extent, prolapsus of the pelvic organs will follow in time, except in three conditions:

1. Where the injury is compensated for by the muscles (which still maintain their attachment to the vagina and rectum) drawing the remaining portion of the pelvic floor upward, forward, and toward the pubes, thereby closing the vaginal orifice and supporting the pelvic organs.

2. Where by reason of some intra-pelvic inflammation the organs have become fixed by adhesions; and,

3. Where the patient is abundantly supplied with adipose tissue, and takes very little active exercise.

Excepting under the circumstances here named, prolapsus of the pelvic organs invariably occurs after important injuries of the pelvic floor. The displacement does not follow the injury immediately, but, as a rule, comes on slowly. This conclusion has been arrived at from a large number of clinical observations, and it helps to definitely settle the question regarding the value of the pelvic floor as a means of support for the pelvic organs. From these facts one may obtain the key to the differences of opinion which have been held by gynecologists regarding the functions of the pelvic floor. Those who believe that it plays a secondary part in maintaining the pelvic organs in position argue that there are anatomical structures which sustain the pelvic organs in place without aid from the pelvic floor, and, in proof of this, point to the fact that the removal of the pelvic floor is not followed by displacement of the pelvic organs. This is often seen in cases in which lacerations sufficient to largely impair the function of the pelvic floor have existed for years in women in active life without the occurrence of prolapsus of the pelvic organs. And, more than all this, it is said, prolapsus of the pelvic organs occurs where there is no apparent injury of the pelvic floor—i. e., no laceration of the perinæum. The fallacies of this argument are that, although the pelvic organs are held in position by supports that are sufficient to resist ordinary taxation for a given time, they are not able to do so under extraordinary pressure for any length of time unaided by the pelvic floor.

Again, the cases cited in which prolapsus does not occur when the perinæum is lacerated belong to one of the three exceptional states which I have already given.

And, finally, the cases in which there is prolapsus while the pelvic floor appears to be uninjured are, as a rule, cases of mistaken diagnosis, the floor of the pelvis being really imperfect, although not apparently so on examination by the sense of sight alone. Some observers look for a laceration of the perinæum by inspection of its mucous and tegumentary surfaces, and, if injury to these surfaces is not found, they pronounce the pelvic floor perfect, while the fact is that laceration of the perinæum in the median line is only one of many injuries of the pelvic floor which render it functionally imperfect. But granting that the pelvic floor takes no part in supporting the pelvic organs under ordinary taxation, it certainly aids in doing so in case there is extraordinary downward pressure from lifting heavy weights, violent coughing, and the like. Again, when the pelvic floor is injured—say by laceration—and loses the power to support itself and the vagina and rectum, prolapsus, especially of the vagina, occurs. This causes a dragging upon the pelvic organs which in due time will cause them to descend. In view of these well-known facts, the most enthusiastic advocate of the independent supports of the pelvic organs must admit that the pelvic floor is at least indirectly concerned in supporting the structures above it.

The injuries of the pelvic floor are of two classes:

1. Lacerations of the pelvic floor in the median line.
2. Laceration of the levator-ani muscle and separation of the

muscular coat of the vagina from the pelvic floor. This injury is an internal transverse laceration.

The first class is divided into lacerations extending from the vulva down to the sphincter-ani muscle; subcutaneous separation of the muscles and fascia; and lacerations extending from the vulva into the rectum, involving the sphincter ani and less or more of the recto-vaginal septum.

The first of these—laceration of the pelvic floor in the median line—is the injury most frequently sustained during parturition. Several degrees of this injury are described by authors, but in regard to the pathology and treatment there are only two which, in this connection, require attention: the one which extends through the muscles of the anterior portion of the pelvic floor—that is, from the vulva to the sphincter-ani muscle—and the other which extends through the sphincter-ani muscle and into the rectum. The former of these is the injury which is most frequently recognized, and is therefore presumed to occur most frequently, although this point is not yet settled. Certainly it is the least grave in its consequences if properly cared for, because it is the most easily remedied by surgical treatment.

In its simplest form the laceration extends through the mucous membrane of the vagina, the integument, and the junction or union of the bulbo-cavernosus with the transversus-perinæi muscle, a few fibers of the levator ani and the fascia, elastic and areolar tissues which constitute the perineal body.

When this injury is uncomplicated with laceration of the muscles of the pelvic floor elsewhere than at the median line, the separated ends of the muscles involved in the rupture still retain their union with the divided side of the perineal body and with each other. This is very clearly shown by the fact that the bulbo-cavernosus, transversus perinæi, and anterior fibers of the levator-ani muscles hold the separated sides of the perineal body and the posterior, uninjured portion of the pelvic floor upward. At the same time that the posterior portion of the pelvic floor is maintained at its normal elevation, it is often brought forward to compensate for the loss of support caused by the laceration. This compensation does not occur in all cases, but usually does so unless there is damage done to the muscles other than at the median rupture alone. I have observed in some cases sufficient drawing forward to lessen the distance between the meatus urinarius and anus very perceptibly. This is familiar to all who have studied the subject with a view to operating, from the fact that, in order to estimate the depth of the laceration, to determine how extensive the vivifying of tissue need be, it is necessary to retract the posterior portion of the pelvic floor with the finger or sound in order to press the rectum or anus backward into its place. This compensation prevents prolapsus of the pelvic organs for a long time, in some cases for many years, and is one reason why rupture of the perineal body is not always followed by prolapsus uteri. In this condition the vulva is not enlarged from distention by the partially inverted vaginal walls, nor is the uterus necessarily displaced. Many such cases are seen among patients who seek relief for other affections, but have no symptoms which can be traced to the laceration, except occasional pain in the scar tissue in the injured part.

In cases of long standing the posterior vaginal wall becomes prolapsed. This condition has been described as rectocele. The diagnosis is made by inspection.

The second form of injury given in the classification is subcutaneous separation of the muscles and fascia in the median line, usually limited to the transversus perinæi muscle and fascia, but in rare cases involving the sphincter-ani muscle.

Years ago, when I first called attention to this subject, I was not aware that the sphincter ani was ever involved in this form of injury, but I have seen since then at least three cases in which the sphincter ani was lacerated completely while the integument and mucous membrane of the vagina remained uninjured. The evidences that my observations were correct are that there was incontinence, the integument on either side was depressed where the lower fibers of the retracted muscles had drawn it inward, and the most careful examination proved beyond a question that the integument had never been lacerated. I am aware of the fact that a complete laceration in the median line may unite by first intention, leaving the sphincter ani ununited, and that the scar may be so faint as to be easily overlooked, but in the cases I have referred to I am positive from my own examination, and that of my associates, that no such injury to the integument ever occurred. Furthermore, I found in operating that when the integument was divided some thickening of the cellular tissue was apparent, due no doubt to a reparative exudate which occurred at the time of the injury. I also found the ends of the muscle far apart, the lacerated ends being completely healed over by natural processes. In looking back I recall several more cases of this kind, but not having studied them with sufficient care, they are not available for my present purpose.

The mucous membrane of the vagina and the skin covering the perinæum remain normal, but the transversus-perinæi muscles are torn apart in the median line. The bulbo-cavernosus muscles are separated from their insertion at the center of the perinæum, and possibly some of the fibers of the levator-ani muscle are also lacerated. There is, in short, a complete laceration of the deeper structures of the perinæum, the skin and mucous membrane alone remaining uninjured. The result of this injury is falling of the pelvic floor, and usually prolapsus of the pelvic organs. The function of the pelvic floor is destroyed or impaired as in the injury first described.

I believe that this condition has generally been mistaken for functional imperfection of the perinæum, or relaxation, as it has been called. The fact is, that it is a well-defined anatomical lesion, which can be demonstrated quite easily by passing the finger into the vagina and pressing downward and outward. In this way the absence of the muscles, fascia, and connective tissue is discovered. It is found also by this examination that all muscular resistance is lost in the parts. Again, while the index-finger is in the vagina the parts anterior to the sphincter-ani muscle can be grasped between the finger and thumb, which will show that where the perineal body should be there is only skin and posterior vaginal wall. There is still another method of examination, and perhaps the most critical one—that is, to pass one index-finger into the vagina and the other into the rectum, when it will be found that the only resisting muscular tissue felt between the two fingers is the sphincter ani.

These examinations by the touch are quite sufficient; but if further evidence is desired, it may be obtained by trying to excite contraction of the muscles which act as a sphincter vaginæ. This can be done by the interrupted electric current, or by irritating the labia. In making a vaginal examination, one can observe how actively the muscles of the pelvic floor contract and close the introitus vaginæ in the normal state; but in this injury no such contraction occurs, nor can it be produced by pricking the labia with a needle, or by any such means used to excite reflex action.

In case the levator-ani muscle remains intact, the posterior portion of the pelvic floor remains in its normal position, except that the end of the rectum may be displaced backward, but it rarely is, as a rule, because the vagina and uterus are not prolapsed. The counterpart of this lesion is often seen in cases that have been operated upon with the intention of restoring the pelvic floor or perinæum, the operation having failed in its object. Union of the skin and mucous membrane is obtained, but the muscles are not united, and hence, although upon removing the sutures the result is pronounced to be perfect, and to the superficial observer appears to be so, the muscular function of the pelvic floor has not been restored, and the operation is, in fact, a complete failure.

When the two forms of injury just described have existed for a long time prolapsus of the vaginal walls takes place. The posterior vaginal wall is most frequently displaced and is usually described as a rectocele, but that is incorrect, as will be pointed out in discussing transverse internal lacerations.

The third form of injury in the median line extends from the vulva into the rectum, and includes in the solution of continuity the sphincter-ani muscle and less or more of the recto-vaginal septum.

Rupture through the sphincter ani is the most unfortunate of all injuries of the pelvic floor, owing to the incontinence which follows. The unhappy subjects of this accident are debarred from taking much active exercise, and usually avoid society. Strange as it may appear, they do not all suffer from prolapsus of the pelvic organs; in fact, I think that prolapsus following this injury, to any great degree at least, is the exception. This is, no doubt, due to the fact that such patients are unable to do much walking or standing, and therefore the pelvic organs are not submitted to much downward pressure. It might be supposed that relief from this distressing condition would be sought before sufficient time had elapsed for prolapsus to occur, but this is not always the case, for I have seen several such injuries of many years' standing, and yet there was very little displacement. There is indeed very little falling of the pelvic floor or of its divided sides. This is accounted for by the fact that the laceration extends through the greater portion of the pelvic floor, leaving little remaining to settle downward. In most cases the two halves of the floor are held well up in position by the muscles which are attached to them. When the laceration is through the sphincter-ani muscle only, and does not extend upward into the anterior wall of the rectum and the posterior wall of the vagina, there is a little control of the rectum still retained.

This retaining power is sometimes favored by a band of scar tissue, which lies between the upper fibers of the divided sphincter, and gives a fixed point toward which the muscle can contract in an imperfect way. There is usually prolapsus of the mucous membrane of the rectum in cases of long standing, and the prolapsus is almost always greater if the wall of the vagina and rectum are also lacerated to any great extent.

Injuries of the second class, which are transverse, and have been described as internal lacerations, consist in laceration of the anterior fibers of the levator-ani muscle and fascia, and this is usually attended with separation of the muscular layer of the vaginal wall from the pelvic floor. In some cases the laceration is complete, involving the mucous membrane as well as the muscular coat of the vagina, and in very rare cases the laceration reaches upward and outward as far as the laceration of the levator-ani muscle extends, but as a rule the laceration of the levator ani is subcutaneous—that is to say, not attended with laceration of the mucous membrane of the vaginal wall. The injury of this muscle, I believe, was first described in my early writing on the subject, but if this is an unjust claim on my part I shall be happy to have it corrected.

The pathological changes which ultimately take place in the transverse lacerations are: A marked sagging of the pelvic floor, which in itself may be perfectly normal in structure. This sagging is apparent upon inspection, and, as I have elsewhere pointed out, the diagnosis of this laceration is made from the fact that under stimulation the levator-ani muscle fails to perform its function. The action of this muscle is to a large extent voluntary, and this voluntary power is lost and stimulation fails to call it into action. Of course, the continuation of this sagging gives rise to or permits prolapsus of the vaginal walls, uterus, and bladder. Rectocele is also said to follow in this injury, and possibly it may in rare cases, but I am fully assured from careful observation that the so-called rectocele is not a rectocele at all, but a prolapsus of the vaginal wall and a varicose condition of the veins lying between the vagina and the rectum just within or above the pelvic floor. This I have been able to demonstrate, in a vast majority of cases, by an examination which proved that there was no rectal diverticulum pointing toward the vulva, and that pressure upon the so-called rec-

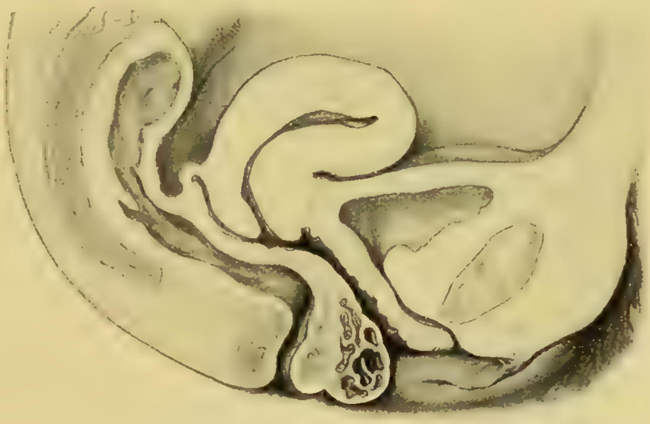


FIG. 62.—The so-called rectocele, being a prolapse of the vaginal wall, with varicose veins beneath it.

tocele caused it to disappear as soon as the blood was pressed out of the enlarged veins. This is shown in Fig. 62. An argument which has been made against this by one of my friends, to whom I have explained my views on the subject, is that he has noticed in fæcal accumulations the rectocele protruding through the vulva, especially on voluntary efforts being made to evacuate the rectum. This is offset by the fact that in most of such cases I have found that when the rectum is emptied its muscular walls contract and there is no diverticulum left. Of course, the rectum loses its support when the levator-ani muscle is lacerated, and is easily overdistended, and the distention must be toward the vagina and vulva, but is temporary, not permanent, and hence not a rectocele. I may say further in reference to this form of injury that it is followed by pathological changes which give rise to more distressing symptoms than any other. It is in this form of injury that prolapsus more frequently occurs, not only of the uterus and vaginal walls, but also of the bladder; and there is greater liability than in any other injury to the formation of varicose veins around the lower portion of the vagina and rectum, which give rise to no small degree of suffering. In this injury, too, subinvolution of the vagina and uterus most frequently occurs. More than that, I believe that there is in addition to the subinvolution of the vagina a certain degree of areolar hyperplasia, which accounts for the extraordinary thickening of the vaginal walls seen in this class; still more, if relief is not obtained there comes a time when atrophic changes of the vaginal walls take place which cause further changes in the venous circulation, and if the injury goes many years without repair, atrophy of the levator-ani muscle occurs, and such changed structures become absolutely incurable by any method of operating. It is quite a number of years (sixteen or eighteen) since I called attention to the atrophic changes in the muscles which take place in cases of long standing, and though a certain amount

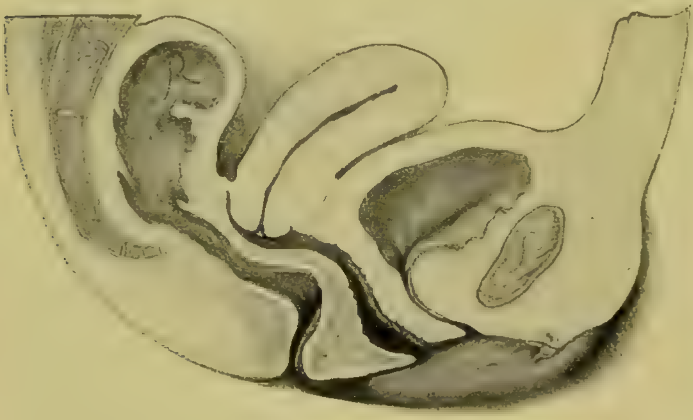


Fig. 63.—Beginning atrophy of perineal body in the median line.

of temporary relief is obtained by operating, prolapsus of all the pelvic organs recurs.

I formerly believed that in connection with transverse lacerations a subcutaneous laceration in the median line (Fig. 63) sometimes occurred, but I am satisfied now, after more extended observation, that in place of a laceration there is a thinning out and absorption of the tissues in the median line which produces a condition similar to that of subcutaneous laceration. This absorption is brought about by the sagging of the pelvic floor, which makes undue traction upon the transversus perinæi muscles and fascia, and as the posterior wall becomes prolapsed additional pressure is made at that point, and hence the absorption or atrophy which takes place in the median line. This change of structure resembles in every particular the lesion of subcutaneous laceration (Fig. 64), but it is only found in cases that have existed for a long time, in which there is marked prolapsus of the vaginal walls and, of course, great sagging of the entire pelvic floor. These facts in regard to pathology have a very important bearing upon the question of treatment, as will be noted further on.

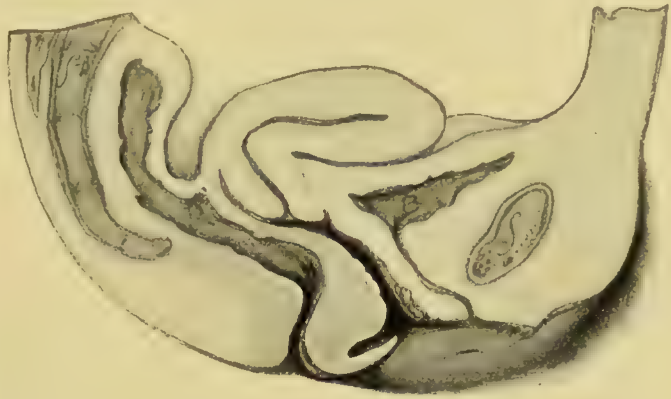


FIG. 64.—Atrophy in the median line, with sagging of the posterior vaginal wall resembling subcutaneous transverse laceration.

Symptomatology.—The symptoms which are developed by injuries to the pelvic floor are not sufficiently diagnostic, or else they have not yet been sufficiently studied, to make them of decided value to the diagnostician. Patients have a feeling of want of support of the pelvic organs, or, as they express it, a dragging-down feeling, and some derangement of the functions of the rectum and bladder, but, as these symptoms occur in all the forms of injury named, and as they also in like manner occur in displacement of the pelvic organs, but little reliance can be placed upon them. When the function of the levator-ani muscle is lost from injury or atrophy, there is usually much difficulty in evacuating the rectum. This is, of course, most marked when the patient is constipated, but it is noticed also when the bowels are free, though to a less extent. When there has been a laceration in the median line the scar tissue is often tender to the touch, and occasionally causes some general nervous disturbance. The sensitiveness of this scar tissue is sometimes so great as to produce reflex muscular contraction when touched while the patient is anæsthetized. The admission and expulsion of air from the vagina (flatus vaginalis) is said to occur frequently in these injuries, and it is no doubt one of the most reliable symptoms of injuries of the pelvic floor, as it rarely occurs in any other condition.

In cases complicated with prolapsus of the vaginal walls, bladder, and uterus the symptoms belonging to these affections are present. In cases of laceration in the median line involving the sphincter-ani muscle the control of the rectum is lost. This symptom points to the nature of the lesion directly.

Physical Signs.—Inspection reveals the structural changes that have taken place in the lacerations in the median line, so that the diagnosis could be easily made by direct examination.

Subcutaneous lacerations of the muscles and fascia in the median line are detected by muscle and fascia. These escape notice at the time when they occur unless carefully looked for. They are easily detected, however, by grasping the pelvic floor in the median line between the thumb and finger. By this manipulation it will be found that all the structures, except the mucous membrane of the vagina and integument, have been divided and retracted, and there is nothing left of the fascia and muscular structure in the median line excepting the sphincter-ani muscle.

The transverse internal laceration, when entirely confined to the muscular structures of the vagina and levator-ani muscle, is not an easy lesion to detect, owing to the fact that a similar condition is produced by sagging of the pelvic floor, following delivery and temporary paralysis.

One of the pathological changes which take place in transverse laceration is a marked sagging of the pelvic floor, which in itself may be perfectly normal in structure. This sagging is apparent upon inspection, and the diagnosis of this laceration is made from the fact that under stimulation the levator-ani muscle fails to perform its function. The action of this muscle is to a large extent voluntary, and this voluntary power is lost and stimulation fails to call it into action.

Fig. 65 shows the downward displacement resulting from the injury to the muscles. This displacement can be demonstrated upon the subject by placing one finger upon the pubes and the other on the tip of the coccyx, and observing the extent to which the pelvic floor projects below these two points. Again, by placing the patient upon the side and flexing the thighs at right angles with the trunk, the downward displacement becomes apparent. In the most pronounced cases the parts project downward almost on a line with the nates. The physical signs of this condition will be referred to again in connection with atrophy of the muscles, and the differential points will be noted.

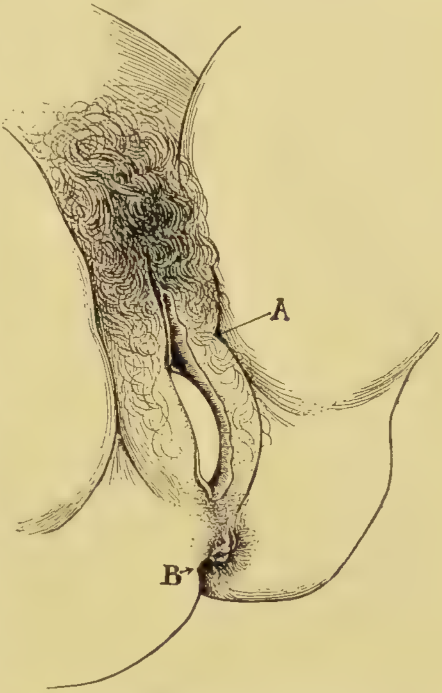


FIG. 65.—Sagging of the pelvic floor. The sweep from A to B denotes the sagging portion of the pelvic floor. The bulging posterior vaginal wall (rectocele) shows white between the labia.

In the diagnosis of all these injuries, the all-important question is to determine whether the paralysis is due to overdistention of the muscles and is temporary only, or due to atrophy, and hence permanent. This can not always be settled at once and positively. If the tissues of the pelvic floor appear to the touch to be lacking muscular fiber, and no muscular contraction can be induced by stimulation, it is presumptive evidence of muscular atrophy; and yet it may be only a temporary loss of muscular power. It is necessary, then, to support the pelvic floor and let the patient rest in the recumbent position to remove all downward pressure from the parts, and, by the use of astringents and electricity, endeavor to restore the muscular function sufficiently to prove that there is still muscular tissue present. If by such means the muscular function is even partially restored, the diagnosis is completed, and the indications for further treatment are established. It is then, and only then, that surgical treatment may be employed with the hope of obtaining complete recovery. Should all well-directed efforts fail to give evidence that the muscles still retain their true anatomical characteristics, it is useless to hope for success in operating.

Causation.—The causes of these injuries of the pelvic floor are traumatic (excepting the last one described), that is, overdistention or stretching of the parts during parturition. The exceptions to this have already been mentioned, viz., long-continued overdistention from prolapsus of the pelvic organs, extreme constipation, and malnutrition in old age.

There are, no doubt, certain states which predispose to these injuries. Phlegmatic women who have failed to take exercise sufficient to develop these muscles are liable to lacerations during parturition. In such cases the muscles of the pelvic floor are poor in quality, and rupture easily under extreme pressure. The very opposite of this apparently predisposes to the same accidents. In vigorous muscular women the pelvic floor is often unyielding because of the great strength of its muscles. They resist the pressure of the child as it is forced against the pelvic floor by a powerful uterus, and, seemingly, rather than relax and stretch, their union at the median line gives way; it is in such cases that complete laceration in the first degree is most likely to occur. Again, in those in whom the pelvis is shallow and wide in the straits, the child passes easily through the pelvic canal, when rather sudden, unrestrained pressure comes upon the parts and they are very liable to give way. In others still, either from habits of life or the position of the uterus in relation to the pelvis, the return circulation is retarded, the vessels become overdistended, and a deranged nutrition, with softening of the tissues of the pelvic floor, renders them easily torn.

The immediate cause of lacerations, whether subcutaneous or complete, is distention during delivery. The tissues in the median line give way, in the great majority of cases, because the greatest pressure is brought to bear at that point. That the laceration extends to, but not through, the sphincter-ani muscle, as a rule, is no doubt due to the strength of this muscle. In fact, it is a matter of surprise that the sphincter is ever lacerated when its position is considered in relation to the force brought to bear upon it. The only rational explanation of the laceration which I have been able to obtain from a careful clinical study of the matter is as follows: The transversus-perinæi, levator-ani, and bulbo-cavernosus muscles are so strongly attached to the sphincter-ani muscles that, during delivery, when the head distends the pelvic floor they hold the sphincter ani upward and forward. If the size of the head is out of proportion to the distensibility of the pelvic floor, one of two injuries must occur: either the muscles attached to the sphincter must give way and permit the sphincter to recede downward and escape injury, or else the sphincter must be torn through. This effect of the other muscles upon the sphincter ani during delivery of the child's head can be seen by the way in which the sphincter ani is drawn upward until the anus is distended an inch or two. While the fetal head was unusually distending the pelvic floor, and while the hand was placed upon the parts to "support the perinæum," I have felt, or fancied that I could feel, the muscles attached to the sphincter ani give way and permit the rectum to recede and escape injury.

Regarding the causes of injuries to the levator-ani muscle, one has but to recall the phenomena of labor as related to it to understand how it may be freely lacerated in ordinary labor. It certainly is as fully exposed to injury as the other muscles which we know are frequently lacerated subcutaneously. In delivery with forceps, the levator-ani muscle is frequently injured, I believe. While the child's head is in the grasp of the forceps and during traction, I have noticed, by passing the finger into the rectum, that the levator ani was drawn so tightly over the edges of the blades of the forceps that it appeared as if it must be torn, and I feel sure that it often is. I am the more fully convinced of the truth of this by having carefully watched patients that I had delivered with forceps, and have found in some of them evidence of injury of the levator ani above its lower attachment. That evidence was obtained by finding, on subsequent vaginal examination, that the resistance of the levator muscle usually found was wanting, and also that there was prolapsus of the pelvic floor, and loss of contractility upon irritating the parts.

Treatment.—The object in treating these injuries should be to restore the lacerated muscles by securing union of their severed fibers. In the ordinary or most commonly recognized injury, laceration in the median line down to, but not through, the sphincter, the immediate treatment usually employed is to close the wound with sutures at once, or to cleanse the wound from blood clots and coapt the parts, carefully bind the patient's limbs together, and trust that union may follow. The treatment by the immediate use of the suture will be made plain by the following:

Primary Operation.—The wound, if seen when it occurs, is triangular, the base running parallel to the rectum and the apex being at the posterior part of the vulva. The sides of the wound come together quite easily, and only require well-adjusted sutures to keep them in position. Much care is necessary in using the sutures. If they are imperfectly introduced they do harm by preventing the union which often takes place without surgical aid. If one is not accustomed to this simple operation of closing the wound with sutures, it would be infinitely better for the patient to trust to nature than to have the surgeon employ sutures in a bungling way. The sutures should be introduced as follows: The needle, held in the groove at right angles to the forceps, should be entered in the skin exactly at the edge of the wound, and as far down as the deepest part; it is then carried into the tissues and made to describe the arc of a circle and emerge at the margin of the mucous membrane of the vagina. The needle is again introduced on the opposite side and carried through as before, and brought out at the point in the skin opposite where it was first introduced. If this is properly done, the position of the suture in the tissue will be as represented in Fig. 66. The center lines represent the sides of the wound, and the dotted line shows the suture, which describes a circle, the point at which the suture is tied and the opposite point of its circumference being at the upper and lower angles of the wound. There are three advantages in using the suture in this way: First, the ends of the suture coming out at the edges of the wound hold the parts exactly together without the aid of superficial sutures; second, the curve which the suture takes deep under the tissues brings the central portions of the wound together, whereas, if the suture is passed straight through the tissues, the edges of the wound would curve inward, while the central parts would not meet. Fig. 67 shows the parts adjusted by a proper suture, while Fig. 68 shows the effect of the imperfect one. Again, the suture running deep into the tissues gives additional surety of catching the ends of the muscles so as to reunite them, which is the chief object of the operation. In the primary operation—i. e., the introduction of sutures immediately after the injury occurs—Peaslee's needle is easier to use than the ordinary perineal needle. Fig. 69 shows the instrument. This needle, with a handle, and an eye near the point, is armed with a thread and passed through the tissues as already described, and the end of the suture is passed under the thread in the needle; this is then withdrawn and

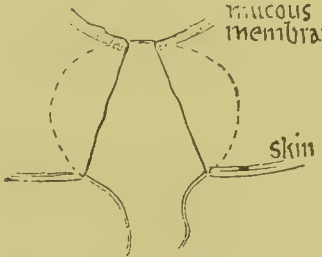
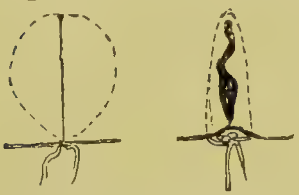


FIG. 66.—Diagram of the sweep of the suture.



FIGS. 67, 68.—Sutures properly and improperly introduced.

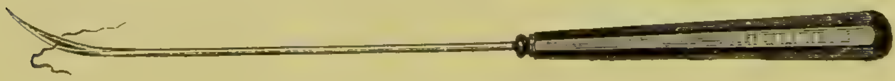


FIG. 69.—Peaslee's needle.

brings one end of the suture into the tissues. The operation is repeated on the other side, which completes the introduction of the suture. The only advantage of this needle is that it is easier to manage than the ordinary one. It can only be used, however, in the primary operation. The silk suture properly prepared is by far the best for the immediate operation. Silver wire, which at one time was the only suture which could be relied upon, has been superseded by others that are vastly superior for this purpose. It is impossible to keep the parts clean after confinement without causing pain while the ends of silver-wire sutures are projecting from the parts. Catgut sutures are employed by some, but they are most unsatisfactory. They decompose, and by causing suppuration prevent healing.

Apfelstedt recommends the method proposed by Veit of confining the suture to the perinæum in the closure of recent tears, on the ground (1) that needle holes in the vagina or rectum favor infection of the wound ; (2) that too many stitches destroy too much tissue ; and (3) that when they are knotted a cavity is likely to be left in the wound. He uses two needles to each thread of silkworm gut or silk ; these are inserted where the wounded surfaces meet, so as to emerge near the perineal wound. The first needle passes two millimetres below the junction of the two wounded edges of mucosa, and the lowest in the same way, two millimetres above the point where the edges of the wound in the rectal mucosa meet, the lines of the stitches spreading toward the perinæum like a fan. Six or eight sutures are enough. The middle ones are drawn quite tight, the others but moderately so before being knotted. This method has been used by Apfelstedt since 1892. All the vagino-perineal lacerations have healed, and three out of four total lacerations.

This constitutes the whole primary treatment of injuries of the pelvic floor, as given in our text-books—a kind of management generally sufficient in central lacerations, but that can have little influence in restoring the other forms of injury. To secure the reunion of the muscles that have been lacerated subcutaneously, especially the levator ani, the parts should be well supported and kept at rest. If the pelvic floor is permitted to remain in its relaxed and displaced position there is but little chance of the lacerated muscles uniting, nor, in case they are simply overtaxed by distention, will they regain their tonicity promptly if left unaided by support. Especially is restoration likely to be prevented if the patient is permitted to assume the erect position too soon, and if, to increase the injurious effects of this unwise liberty, the uterus is crowded down into the pelvis by a compress and tight bandage applied around the body. In all cases of injury in which concealed laceration of the muscles is suspected, the pelvic floor should be well supported with a compress and bandage fastened to the abdominal binder. By these means the severed ends of the muscular fibers are brought nearer together, so that they have a better chance to unite. An objection would naturally be raised to this treatment on the ground that it would obstruct the free flow of the lochia. This can be overcome by making the compress of absorbent cotton, antiseptic gauze, or marine lint, and draining the vagina with a drainage-tube or a strip of gauze or lint. I believe that in this way the vagina can be drained and kept as clean as it can be by occasional douching. In fact, I am inclined to think that the very frequent use of vaginal injections so generally employed in this age of antiseptic obstetrical practice often tends to retard the restoration of injuries of the pelvic floor. It is well, also, to let the patient rest upon either side after the first twelve or twenty-four hours. This position takes off all pressure from above, and favors the upward inclination of the pelvic floor. Great care should be taken to avoid distention of the bladder and rectum. Constipation after confinement is almost sure to prevent or, at least, retard recovery. By attending to these simple means much can be done toward preventing that incurable condition, permanent paralysis from atrophy.

After convalescence from confinement, in case it is found that, although there is no complete loss of muscular action in any part of the pelvic floor, there is a muscular weakness shown by the impaired power of resistance to pressure, the supporting treatment, with judicious rest and exercise well regulated, should be kept up until strength is restored.

The restoration of the function of the muscles, as already stated in speaking of general treatment, is the great object of all surgical operations for the relief of these injuries of the pelvic floor. It matters not how much tissue may be gathered together and united in the region of the perineal body, it will have no functional action if destitute of muscular tissue. The success of all surgical procedures depends upon the restoration of the muscles, elastic tissue, and fascia, and not the mere uniting of the tegumentary and areolar tissue.

In this plastic operation, known as perineorrhaphy, or restoration of the perinæum, much surgical skill is necessary in order to succeed. This is true of all operative surgery, and yet special care is necessary in this operation, because union by first intention must be secured or else the operation will fail. In many operations in surgery, if the wound does not heal by first intention, union may be secured by granulation and a perfect result obtained; but in the operation under consideration, if the whole or any part fails to unite promptly, partial or complete failure is the result. This calls for the employment of all known surgical means most favorable to prompt healing. On this account, then, some general considerations regarding plastic operations in gynecology will be in place before describing the methods of operating. What will follow on this subject will apply equally to all operations about the pelvic floor and pelvic organs, especially lacerations of the cervix uteri.

The following may be given as the conditions necessary for the healing of the wounds in question:

1. A condition of the wound and of the general system favorable to the repair of injuries.

2. Perfect coaptation and retention of the parts to be united, and protection of the parts from extrinsic and offending agents during and after coaptation.

If these conditions are all secured, success must of necessity follow. The management of wounds is not a matter of blind chance. The process of repair in living tissues is governed by definite laws which are always the same under identical circumstances. To obtain the conditions necessary to the fulfillment of these laws is often difficult and sometimes impossible; still, the nearer we come to all the requirements the more surely will the desired ends be accomplished.

The first of these conditions, viz., good general health, may be found wanting in many ways and degrees which are too familiar to require notice, but there are some of these which may be mentioned because they are very often overlooked—preoccupation of the system by some highly taxing function, like lactation, for example, and certain deranged states of the nervous system. These certainly have an important bearing upon the healing of wounds, although little if anything is said in our works on surgery regarding them. In fact, there is good reason for believing that enfeebled states of the nervous system have much to do with retarding the healing of wounds, even when the general nutrition appears to be normal. We frequently hear surgeons say that patients recover from injuries much more promptly when they have courage and hope without fear; but exhausted and irritable states of the nervous system retard the process of repair, although the patient may be indifferent or perfectly satisfied in regard to recovery.

Regarding the unfavorable conditions of the tissues generally met with, the following are the most important:

Contusions.—Contusions accompanying wounds caused by parturition. Lacerated wounds of the pelvic organs often heal promptly if well coaptated immediately after they occur, but no such union should be expected in case the tissues are greatly contused. While this is true of the immediate treatment of wounds sustained during labor, it is pretty definitely settled that operation wounds made during the process of involution—that is, within four or six weeks after confinement—often fail to unite. From this we learn that while tissues are undergoing involution they are not in the best condition to heal; and also that, when involution is delayed beyond the usual time, treatment should be employed to complete the process before undertaking plastic operations.

Scrupulous care is also required in preparing the tissues by making clean, accurate incisions which will give smooth surfaces to the parts to be united. Old scar tissue should also be removed from all wounds where union by first intention is desired. These are rules in surgery which are well known, but they are sometimes overlooked in practice.

Hæmorrhage.—Hæmorrhage in these operations is often a source of difficulty and delay to the operator, but, worse than that, it is sometimes the cause of failure. In the vast majority of surgical operations all that is required of the surgeon is to arrest the hæmorrhage, by any of the ordinary means, in order to secure a good result; but in the operations in question, if some kinds of styptics are used, they prevent union. Cases differ so very much in regard to hæmorrhage that I have given much thought to the predisposing causes of this bleeding tendency, so marked in some patients. The hæmorrhagic diathesis in its most typical form is generally found in men, but a less marked hæmorrhagic tendency is common to many women, and these are very unpleasant subjects to operate upon. During the past few years it has been my misfortune to meet with quite a number of cases in which the bleeding tendency was noticeable. The cause of this in most of them, I think, was impaired general health, due to exhausting conditions of life rather than to any congenital imperfection of the blood itself. Another very important element I have found to be mechanical interruption of the circulation, the pelvic organs becoming congested from retardation of the portal circulation, induced by hepatic disorders, sedentary habits, tight lacing, and so forth. The products of former pelvic inflammations, such as pelvic cellulitis, also tend to maintain a hyperæmic state of the pelvic organs; this we often find long after all evidence of active inflammation has subsided. The condition at the time also is often favorable for bleeding; the well-defined vascularity which exists in conditions such as imperfect involution insures hæmorrhage in all operations undertaken during such unfavorable states. The possible hæmorrhage from such causes can be avoided by the proper selection and preparation of cases before operating.

The rule which should be followed in this matter is to secure the best possible state of the general health of the patient, and to reduce all hyperæmic states of the pelvic organs as far as possible. This is generally possible to a great extent, because the object of plastic operations is to restore the organs to their original form and structure, differing in this regard from many other operations in surgery which have for their object the removal of diseased parts.

In carrying out this plan of treatment, however, there is one difficulty encountered in practice; when patients are ill and suffering they will gladly accept any operation which promises them relief, but, when they are free from pain and have gained in health, they hesitate about undergoing any surgical treatment which is designed to keep them from suffering in the future. This, however, does not prevent the surgeon from advising that which is best. There are patients—fortunately very few—who have the hæmorrhagic diathesis sufficiently marked to debar them from operations, and it is doubtful if any preparatory treatment will change this constitutional peculiarity. Such subjects should be let alone; to operate in these cases is dangerous, and almost always ends in failure. I have had three such cases in the past five years; two of them were operated upon before discovering their peculiarity, the result being depletion of the patients without any benefit from the operation, and the development of extreme caution on the part of the operator in selecting cases in future. The third case was diagnosticated earlier, and I declined to operate.

The management of bleeding vessels in these operation wounds is of great importance. All hæmorrhage should be arrested before bringing the parts together, because a slight oozing, which would do no harm in a wound to be treated by open dressing, may prevent union in wounds in which drainage should not be employed, or, at least, should not necessarily be required. This often requires an amount of time which the surgeon reluctantly bestows, but success in treating this class of wounds depends largely upon attention to this matter. Still more, the means used to arrest hæmorrhage should be such as will not interfere with the process of healing. Hitherto the means employed have been ligation or torsion of the large vessels, and for minor bleeding the use of ice or cold water. More recent experience has pointed out objections to these means. Chilling the tissues by cold is injurious, it is said, and no doubt the statement is true. It has, fortunately, been found that hot water is more efficient in controlling hæmorrhage, and its effects upon the tissues are not unfavorable—hence its use as a styptic in these operation wounds is strongly commended. Torsion is objectionable, because it is less certain to control bleeding than the ligature, and quite as liable to give rise to suppuration. In view of this fact, it may be said without doubt that the antiseptic ligature is the best means of controlling the vessels in these wounds. Regarding the material to be used as a ligature, it may be said that that which can be inclosed in the wound without giving subsequent trouble is the thing required. The properly-prepared catgut ligature fulfills the indications. Some recent experience indicates that the Japanese ligature, made of whale-sinew, is the best, owing to its being absorbed with great facility. Occasionally, in deep lacerations, a small artery on each side may require to be ligated; the chief arterial bleeding, however, comes from the upper portion, the small vessels coming apparently from above downward in the areolar tissue, between the rectum and vagina. These sometimes bleed quite freely, and they are not controlled by tightening the sutures, which arrest the hæmorrhage at points lower down. Such vessels I control by passing a needle through the vaginal mucous membrane above the denuded surfaces, and thus carry a ligature under the bleeding vessels, tying it over the free surface, checking the bleeding on the principle of acupressure. The sutures can be left in position until the perinæum has completely healed; they can then be removed with the aid of the speculum. Occasionally it becomes necessary to ligate some of these vessels which bleed persistently and can not be controlled in the way I have previously described; it is then well to ligate them with a fine catgut ligature, the ends being cut off short and inclosed in the wound.

In spite, however, of all precautions, secondary hæmorrhage will occasionally occur after this operation. I have met with four such cases in my practice; in one of them it occurred on the seventh day after the operation. In all of them the bleeding took place from the upper or vaginal portion of the wound, the blood flowing into and widely distending the vagina before appearing externally.

In my first case I was obliged to remove the sutures, empty the vagina of blood-clots, and ligate the bleeding vessels. This resulted in spoiling my operation, for, although I reintroduced the sutures, union did not take place. This hæmorrhage occurred on the second day.

In my three subsequent cases I secured much better results. Introducing a Sims's speculum on the *anterior* side of the vagina, I removed the clots and blood by sponging, and then, throwing light into the vagina by means of a concave reflector, I was able to see that the blood welled up from the upper portion of the wound. In place of pulling the edges of the wound apart and searching for the bleeding vessels, I passed a curved needle and ligature down and around the place where the bleeding came from, and was able, by tightening my ligature moderately, to control the bleeding entirely. These cases subsequently did well, and the result of the operation was good.

Sutures.—The coaptation of the tissues by means of sutures requires more than a passing notice.

The success which J. Marion-Sims obtained with the silver-wire suture led at once to its general use in gynecological operations. There is, however, good reason for believing that the results obtained by that great surgeon depended as much upon his skill in using sutures as upon the material which he used.

To-day we know that it matters little whether silver-wire or prepared silk sutures are used, provided they are properly introduced. The silk selected should be braided, and not the twisted variety, for the reason that the braided silk retains wax much better, and does not unravel on being handled. The wax in the twisted silk breaks and separates from the silk, and the silk thereby becomes porous and will absorb blood-serum which readily decomposes. The reason why surgeons formerly failed in the operation for vesico-vaginal fistula, when they used silk, was because the organic matter, absorbed by the unprepared silk, decomposed and caused septic inflammation. The braided silk, properly saturated with wax, overcomes this completely. The parts to be united should be brought together and held there without any straining upon the sutures. It is equally important to introduce the sutures so that they will prevent the incurving of the undenuded edges of the parts to be united, and, finally, a sufficient number of sutures should be employed to secure uniform retaining pressure at all parts of the wound.

These are facts which every one is supposed to know before engaging in surgery, but in practice a large number of failures are seen because of neglect in regard to them.

The management of these wounds during the healing process differs somewhat from the modern treatment of wounds in general.

Dressings.—The antiseptic dressings which surgeons use in some form or other are difficult of application in the operations for restoring the cervix uteri and perinæum. So fully is this the case that some of our highest authorities on gynecology make no pretensions to using antiseptic treatment in such wounds, unless frequent bathing of the parts with water and carbolic acid may be called such. No doubt some of our best operators get good results with this kind of after-treatment, but it is more than probable that still better results can be obtained by treatment more in accordance with the rules of antiseptic surgery. Viewed in the light of modern investigation, it appears that the frequent douching of wounds with carbolized water is a practice at least ten years behind the surgery of to-day.

In treating wounds of the perinæum there are many perplexing difficulties in the way of obtaining a proper antiseptic dressing. Here, also, the vaginal douche has been freely used, for the purpose, it is said, of removing vaginal secretions which might irritate the wound and prevent its healing. Such treatment is generally unnecessary, if not injurious. In all operations for repairing old injuries of the perinæum it is better to first cure all uterine and vaginal diseases which give rise to abnormal discharges. That is the only sure way of protecting the operation wound from that source of disturbance. This, of course, can not be accomplished in the treatment of lacerations immediately after confinement. Then it becomes a very important question how to protect the perineal wound from the lochia. Various means have been suggested for this purpose, such as coating the vaginal surface of the wound with collodion, placing carbolized lint or borated cotton upon the inner portion of the wound, and, the most common of all, the frequent use of vaginal injections. It is hardly possible to say, at the present time, which is best. The collodion has not been tried often enough to speak positively regarding it. In using the lint or cotton there is danger of separating the edges of the wound, the very thing of all others to be avoided. Perhaps the best treatment, after carefully cleansing the parts and bringing them accurately together, is to let the wound alone for about two days, trusting that during this time it may become sufficiently protected, by a coating of fresh lymph, to resist the subsequent discharges. After the lochia begin to decompose, the frequent use of the vaginal douche is advisable, and should be continued until the union is completed.

In the secondary operation for restoring the perinæum, the vaginal portion of the wound may generally be left alone. It is protected from the air by the anterior vaginal wall, which makes a suitable dressing provided the uterus and vagina are in a normal condition, as they should be, before the operation is done. If suppuration takes place and pus is discharged into the vagina, it should be disposed of by injections. The outer portion of the wound may also be left without dressing, but it is better to apply lint or cotton upon each side of the sutures; if silver wire is used, or if silk is employed, the lint can be placed over the wound and retained in place by keeping the limbs together. The advantage of this kind of dressing is that it absorbs any discharge that there may be.

Perhaps the most important point of all in the management of such cases is to keep from dropping urine upon the wound. The most scrupulous care should be taken to close the end of the catheter in withdrawing it. If this is neglected, a few drops of urine will escape from the eye of the instrument, and, falling upon the wound, will cause trouble. The nurse should be carefully instructed to use the catheter in this way, and, to make doubly sure of cleanliness, a little absorbent cotton should be placed between the meatus urinarius and the wound every time the instrument is used.

Notwithstanding all this care, suppuration will sometimes occur, and then the question arises how to manage this complication. If the suppuration is limited to the track of one suture, that one may be removed and the remaining ones trusted to keep the parts together. It sometimes happens that a cellulitis which begins in the region of the sutures extends outward and ends in suppuration. This should be treated by a free incision and drainage, which may save the operation. On the other hand, if suppuration takes place between the surfaces to be united, there is very little hope of obtaining union at all by any kind of treatment. A partial or even complete success may be obtained in such cases if the suppurative process is detected early, and drainage from the lower edge of the wound is established. This can be effected by loosening one or more of the sutures, and then introducing carbolized silk thread to secure the free escape of the inflammatory products.

DESCRIPTION OF THE OPERATION FOR RUPTURE IN THE MEDIAN LINE.

The first part of the operation consists in denuding the surfaces to be united. The extent to which this should be carried depends upon the character of the injury. If there is no prolapsus of the pelvic floor of the posterior vaginal wall (see Fig. 65), it will suffice to denude the surfaces as far as the original laceration extended and no farther. This can be done by tracing the outline of the scar tissue formed by the healing after the laceration. This scar tissue contracts and brings the normal tissues toward each other so that the portion to be exsected, as indicated by the rule given here, appears to be very small and insufficient; but, when the scar tissue is removed, the skin and mucous membrane retract and make the denuded surface large enough—much larger, in fact, than the piece of tissue taken away. If more tissue is removed in such cases and good union is obtained, the introitus vaginæ is made too small.

When the sides of the laceration are drawn outward and the pelvic floor is prolapsed, and the distance from the meatus urinarius to the anterior portion of the sphincter ani is increased to an abnormal degree (see Fig. 65), the denudation should be made high enough on either side to make sure, if possible, to unite the loose ends of the bulbo-cavernosus muscle. To do this the original scar tissue should not be taken as a guide in vivifying the parts. On the contrary, the vivifying should be carried upward on either side to within an inch or less of the lower side of the vestibule. In this condition there is usually prolapsus of the posterior vaginal wall, and when such is the case the denudation should be carried upward a little higher.

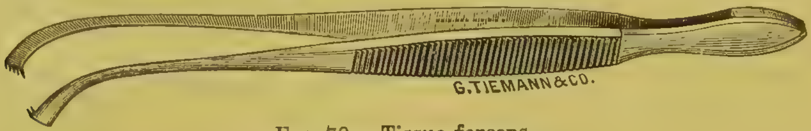


FIG. 70.—Tissue forceps.

The instruments for denuding the parts are a number of sponges fixed in holders, a tissue forceps (see Fig. 70), and Emmet's curved scissors, four in number, two with lesser curves and two with greater (see Figs. 71 and 72). These instruments can not be described; they must be seen to be understood.

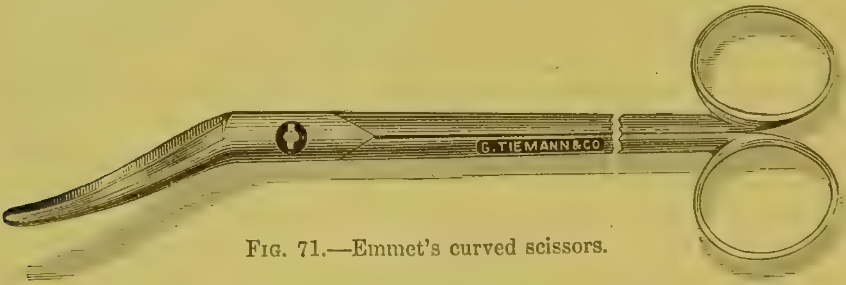


FIG. 71.—Emmet's curved scissors.

The method of operating is as follows: The patient is placed upon the operating-table in the lithotomy position, and the limbs held in a Clover crutch or a sheet arranged according to Dickinson's method. An assistant on each side separates the labia to fully expose the parts; the operator, seated in front of the patient, seizes the tissues with the forceps on the left side as high up as the denudation should extend, and with the scissors removes a strip at the junction of the skin and mucous membrane across to a corresponding point on the right. The end of the strip should be left attached, the other scissors taken, and the strip continued back to the left again. In this way the continuous strip may be taken out from one side to the other and back again until the whole surface is denuded. The three figures will give a better idea of the mode of procedure than this description.

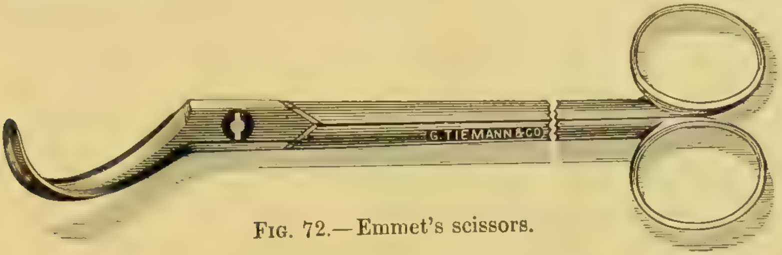


FIG. 72.—Emmet's scissors.

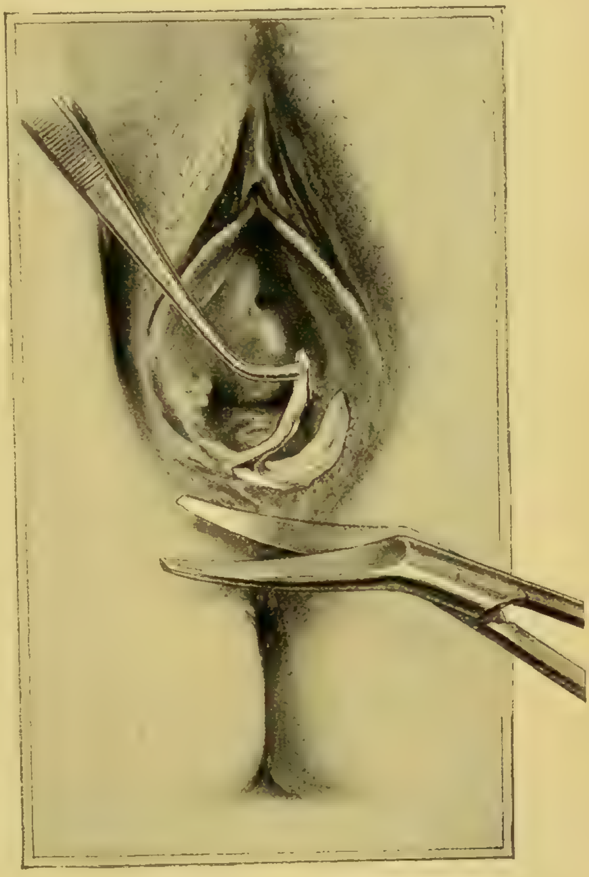


FIG. 73.—First step; denudation begun.

In case there is prolapsus of the vagina—and it is therefore necessary to carry the denudation high up on the vaginal wall—the scissors with the greatest curve should be used at that part of the procedure.

When the whole surface has been denuded in the manner described, it is necessary to make sure that the edges of the wound are straight and alike on both sides, and that the surface is smooth. This can be accomplished by causing the assistants to put the parts upon the stretch, when careful sponging will show any irregularity which needs to be trimmed off. By passing the finger over the fresh surface, any scar tissue that remains can be detected by its density and resistance compared with the softness and elasticity of the normal tissue.

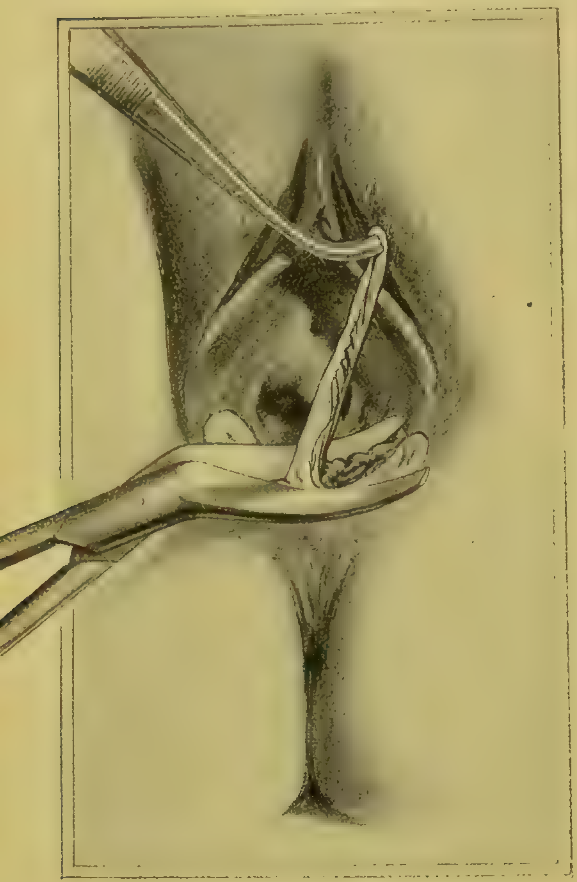


FIG. 74.—Second step; continuing the strip.

At this stage of the operation attention should be given to hæmorrhage. If there are any spurting vessels in the wound they should be controlled by suture or ligature. Fortunately, when such vessels are encountered they are generally at the upper margin of the wound, and may be controlled by passing a fine suture through the mucous membrane of the vagina and under the vessel and then tying it tight enough to stop the bleeding. This has been already noticed under the head of general observations.

Next in order comes the introduction of the sutures, and just here it may be stated that for all plastic operations I use silk sutures prepared as follows: The ordinary braided silk is immersed five or six hours in wax containing six per cent of carbolic acid and six per cent of salicylic acid. The wax is kept all the time at a temperature high enough to liquefy it. This long immersion in the melted wax is necessary to thoroughly saturate the silk. When this is accomplished, the silk is drawn through a carbolized sponge to remove any excess of the wax. It is then put on a reel which is placed in a close-stoppered bottle and kept until required. Nos. 4 and 5 are the sizes used; No. 5 for the lower suture and No. 4 for the upper ones. The needles employed are like the ordinary darning needles, but curved. The larger needles are armed with No. 5 thread and the smaller with No. 4.

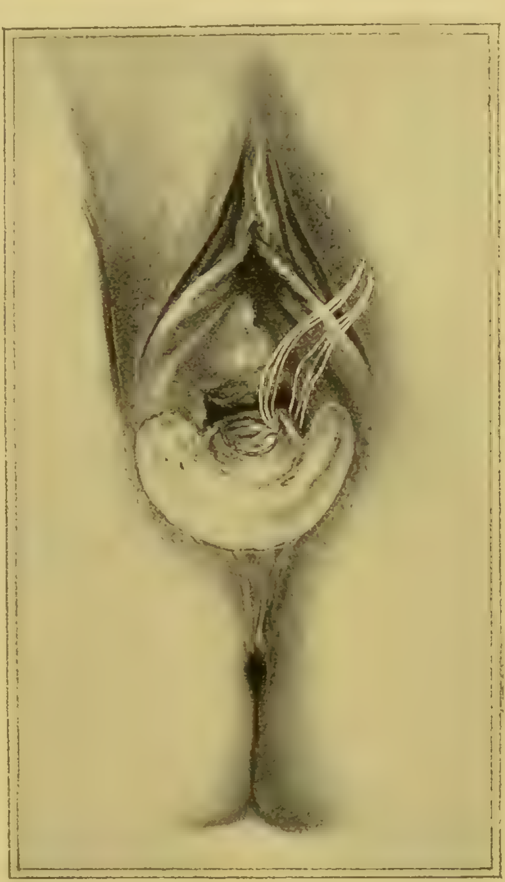


FIG 75.—Vivifying complete; the vaginal sutures on one side are inserted.

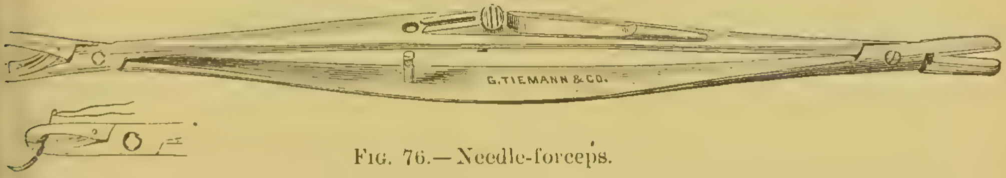


FIG. 76.—Needle-forceps.

To manipulate these needles it is necessary to have a suitable forceps, and for this I have devised the instrument represented by Fig. 76. It is a double forceps. The central portions of the two blades which form the handles are made of spring steel. The halves cross each other at about an inch from each end to form the jaws. At one end the jaws are file-faced on the upper tip and grooved on the lower; at the opposite end the jaws are copper-faced. The latter are used to grasp the point of the needle in drawing it through. The elastic spring of the handle portion opens the jaws at each end, the needle is introduced into the desired groove, the handle is grasped, which closes the jaws and holds the needle perfectly immovable, no matter how much pressure may be brought to bear upon it. When the jaws are closed there is a stop-catch that holds the two halves of the handle together and keeps a firm hold upon the needle. The needle is carried into the tissues while it is held by the grooved and file-faced jaw; it is then unfastened by drawing back the catch, the forceps is reversed, and the point of the needle seized in the copper-faced jaws and withdrawn. The advantage of the copper-faced jaws is that they seize the point of the needle firmly enough to draw it through the tissues without injuring the point—a valuable feature in such an instrument.

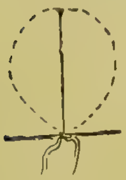


FIG. 77.

The sutures are introduced as follows: The needle—placed in the forceps at right angles to it, should be entered in the skin exactly at the edge of the wound at the lowest external angle of the denuded tissue. It is then passed outward deep into the tissues, then curved round in the tissues in front of the rectum and deep into the tissue of the other side, and made to emerge at a point corresponding to the one where it was entered. If this is properly done, no part of the suture will be seen. Its position in the tissues will be as represented in Fig. 77. The dotted line represents the suture which describes a circle, and the straight line shows the sides of the wound as they are brought together where the suture is tied. Sometimes when the tissues are rigid it is difficult to introduce the first suture with one sweep of the needle. It is then better to pass the needle in through half of the vivified portion, to draw it out and re-insert it at the same point, and carry it around through the other side. If there is sufficient tissue between the base of the vivified part and the rectum, the second and third sutures may be introduced like the first—each one being passed at a higher point. The fourth suture (see Fig. 78) is introduced through the side. It is then carried through about three eighths of an inch of the vivified portion of the vaginal wall, and then passed through the other side. The last suture is passed through both sides, as shown in Fig. 80, the position of the sutures being viewed in profile.

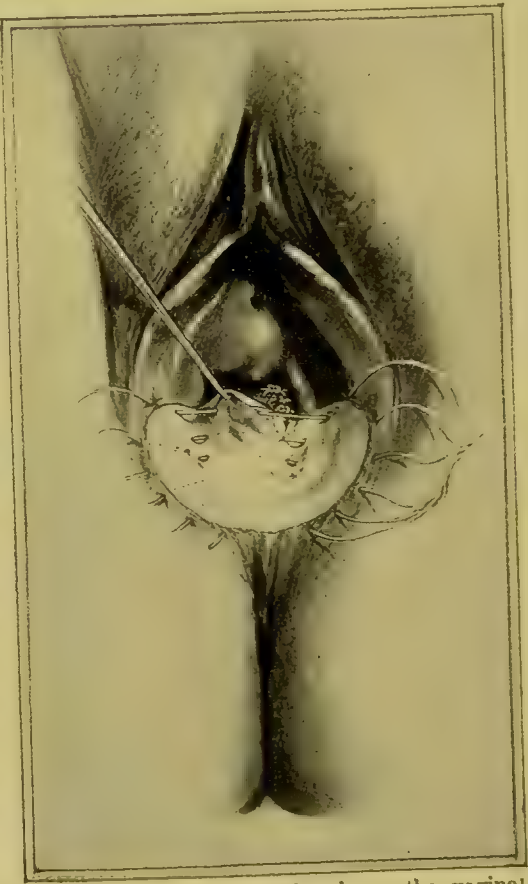


FIG. 78.—The stitches in place; the vaginal sutures tied.

When more than five sutures are used, the fifth is passed like the fourth, only a little above it. Most operators introduce the index-finger into the rectum, to guide the introduction and passing of the needle. This should not be done under any circumstances, because, by so doing, the rectal wall is crowded forward, and is sure to be included in the suture, and, besides, it is a violation of the rules of antiseptic surgery to operate with dirty fingers.

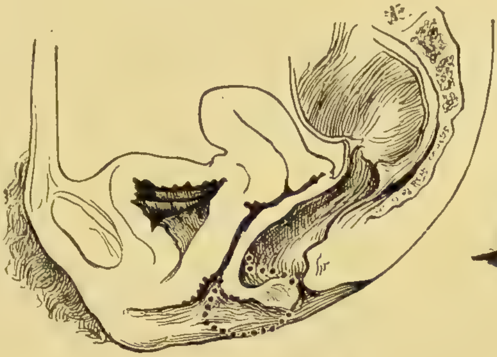


FIG. 79.—Laceration with rectocele. (The dotted line gives the normal location of perineal body.)

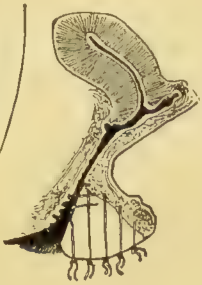


FIG. 80.—Perineal body restored. (Profile view.)

In many cases there is very little tissue left in the perineal body after the vivifying is completed. The muscular coat of the vaginal wall having become atrophied, or torn from its attachments to the floor of the pelvis, there is only the mucous membrane left, and, when that is removed in denuding the parts, the wall of the rectum is all that is left above the skin and sphincter-ani muscle. When such is the case, the first suture only should be carried through the tissue, as already described; the others should be introduced as shown in Fig. 78.

The great advantage of this is, that the sides of the wound are brought together in front of the rectum, the place where the perineal body should be. Furthermore, the sutures introduced in this way avoid the rectal wall—a very important desideratum, as we know from the fact that when any of the sutures are, intentionally or by accident, passed into the wall of the rectum, they cause much pain and rectal tenesmus, and greatly distress the patient, especially when the bowels move. When the sutures are all in place, the wound should be carefully cleansed of all blood-clots, and, if there is still some oozing of blood, traction should be made upon the sutures; if that controls the bleeding, the sutures should be tied in the ordinary way. While they are being tied the sides of the pelvic floor should be pushed up by the assistants, to bring the wound together.

The after-treatment and other points, such as the removal of the sutures, will be brought out in the history of the following cases:

Case of Central Laceration extending to the Sphincter Ani; Uncomplicated.—The patient, a spare, small woman, in good general health. She had been married nine years, and had one child eight years old. Her labor was easy and rapid, and her convalescence uninterrupted, excepting that she had a leucorrhœa which began after the lochia stopped, and continued until the time when she sought medical advice. Her menses returned ten months after her confinement and one month after her child was weaned. Six years after her confinement she overtaxed her strength, and then her leucorrhœa became more profuse, and she began to suffer from backache and slight pelvic tenesmus, especially upon standing or walking. She was constipated, but in all other respects was well. She sought medical advice because of these symptoms and her sterility. An examination showed a laceration, but no other injury to the pelvic floor. The posterior and lateral parts of the floor were well sustained, and there was very little separation of the sides of the laceration. There was commencing prolapsus of the posterior vaginal wall, but it was only apparent upon separating the labia and causing the patient to cough or make downward pressure. The uterus was below its normal elevation, but not changed in its axis. The leucorrhœa was due to a cervical catarrh, which promptly yielded to treatment.

Five days after a menstrual period her bowels were freely moved in the morning by a dose of pulv. glycyrrhizæ comp., given at bedtime the night before. On the following evening the bowels moved spontaneously, and, an hour later, an enema of borax and warm water was given to wash out the rectum. Early next morning the vagina and pudendum were thoroughly cleansed and disinfected and she was anæsthetized with ether, and the operation was performed according to the method already described. The bleeding was easily controlled by the sutures. A small pledget of marine lint was placed over the wound and the knees bandaged together. Soon nausea followed, but no vomiting, and late in the evening she was comfortable, having only a feeling of slight burning in the region of the wound. She took a small cup of tea, and slept several hours during the night.

Next day she had milk, soup, and gruel. The catheter was used for the first forty-eight hours, and after that, when necessary, she was rolled over upon her face, and, with a bed-pan placed under her, she urinated without further help. On the morning of the third day she took a Seidlitz powder, and at noon an enema of castile soap and water, which moved the bowels freely and easily. After this the bowels were moved daily with an enema and she had her usual food.

The marine lint was kept upon the outside of the wound for five days, changing it daily. There was no discharge from the vagina or wound. There were no vaginal injections used, and the wound was not washed at any time. In fact, after the fifth day she had no local treatment.

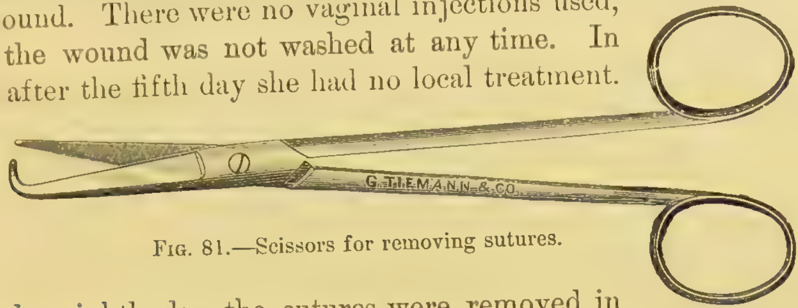
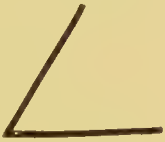


Fig. 81.—Scissors for removing sutures.

On the eighth day the sutures were removed in the following way: She was placed in Sims's position on the bed; the nurse separated the nates, which exposed all the sutures without making any traction upon the parts; each suture was seized with a forceps, and, with the tenaculum blade of the scissors, one side of the thread was caught up and divided. Fig. 81 shows the scissors used for the removal of sutures. It answers the purpose well, and guards against clipping off both ends and leaving the suture in the tissues, an accident which not unfrequently happens. This method of removing the sutures is very much simpler than trying to remove them with the patient upon the back.

The patient was kept in bed until the twelfth day after the operation, but during that time she was allowed to change her position from the back to either side without help. On the thirteenth day she was permitted to sit in a chair, and on the fifteenth day she was allowed to begin to walk.

Two months after the operation she was examined, and the space between the rectum and vagina was found to be normal to the touch —i. e., the lines represented by the lower portion of the posterior vaginal wall and the outer surface of the pelvic floor, running from before backward, formed an angle as represented in the accompanying diagram.



Furthermore, when the introitus vaginæ was retracted with a Sims's speculum and the instrument removed, the muscles promptly contracted and firmly closed the vagina, showing that the muscles had been restored. This I consider to be the only reliable evidence of the success of this operation.

Subcutaneous Laceration in the Median Line.—The first step in the operation for this injury is to make an incision in the skin from the posterior commissure down to the sphincter-ani muscle, and then remove the scar in the cellular tissue and proceed as in the complete laceration just described. In case there is prolapsus of the posterior vaginal wall, the redundant skin and mucous membrane should be removed and the vivifying of the tissues completed by removing all scar tissue.

Laceration of the Pelvic Floor, Sphincter-Ani Muscle, and Recto-Vaginal Septum.—In this extensive injury, in which the laceration of the walls of the rectum and vagina extends upward beyond the internal sphincter ani, it is necessary to restore the septum before operating upon the perinæum. As a rule, the laceration does not extend beyond the sphincters, and the parts can all be restored at one operation, but in the rare injury now under consideration two separate operations are required. I will describe first the operation for restoration of the septum. The patient should be placed in the lithotomy position, and the anterior wall of the vagina elevated by a Sims's or other retractor, which exposes the parts to be treated. The tissues on each side of the laceration are vivified well out on the vagina, in order to obtain a broad surface for coaptation. Only enough of the mucous membrane of the rectum is removed to dispose of the scar tissue that may be present. Silk sutures are introduced with a round-pointed, curved needle, such as Emmet uses for vesico-vaginal fistula. The needle should be introduced at the outer edge of the vivified surface of the vaginal mucous membrane and be carried deep into the tissues, and should emerge just within the edges of the rectal mucous membrane. By referring to Fig. 82 an idea may be obtained of the sutures in position, with this difference, that in this operation silk sutures are used, and are tied upon the vaginal side, whereas in the operation of restoring the sphincter-ani muscle and perinæum, catgut sutures are employed, and these are tied upon the rectal side. The introduction of the sutures is begun above, and each one tied when introduced.

The sutures should be No. 3 silk, and not more than an eighth and a sixteenth of an inch apart. They should be removed on the eighth day, and one month allowed to elapse before the next operation is performed, in order to give the parts a chance to become firmly united.

OPERATION FOR THE RESTORATION OF THE SPHINCTER ANI AND PERINÆUM.

It has been already stated that the chief object of all plastic operations upon the pelvic floor should be to restore the muscles that have been injured. This is pre-eminently so in the operation to be described, because the sphincter ani is the most difficult to restore, and the results of failure are so apparent that neither the surgeon nor patient can possibly believe that the operation is a success when it is not—a delusion often indulged in regarding the plastic operations to repair the lesser injuries of the pelvic floor.

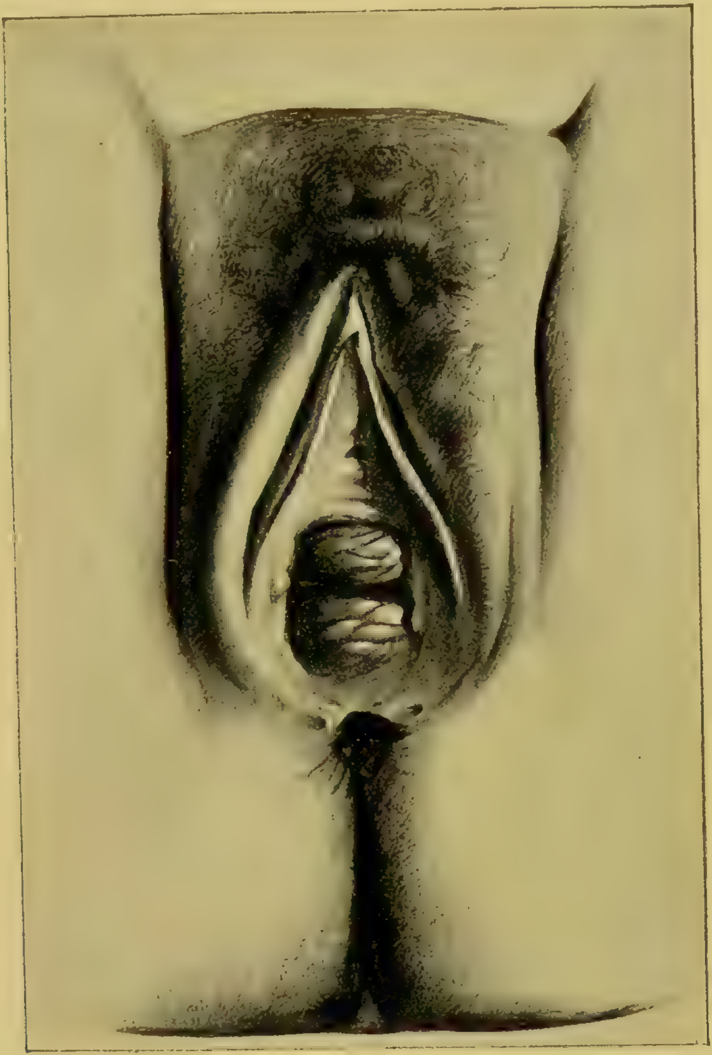


FIG. 82.—Complete laceration of the perinæum and sphincter ani. The depressions on either side of the rectal opening show the separated ends of the torn sphincter. Between the two runs a thin bridge of dense scar tissue. The rectum is drawn toward the pubic arch by a strong levator. Moderate cystocele and rectocele are present.

In order to comprehend the position and relations of the surfaces to be vivified, it must be borne in mind that when the sphincter ani is ruptured the severed ends are drawn outward and backward by the retraction of the muscle until they lie on either side nearly on a line with the posterior walls of the rectum. This may be better understood by referring to Fig. 82. The depressions on either side of the anus are the ends of the muscle which are drawn down below the surface.

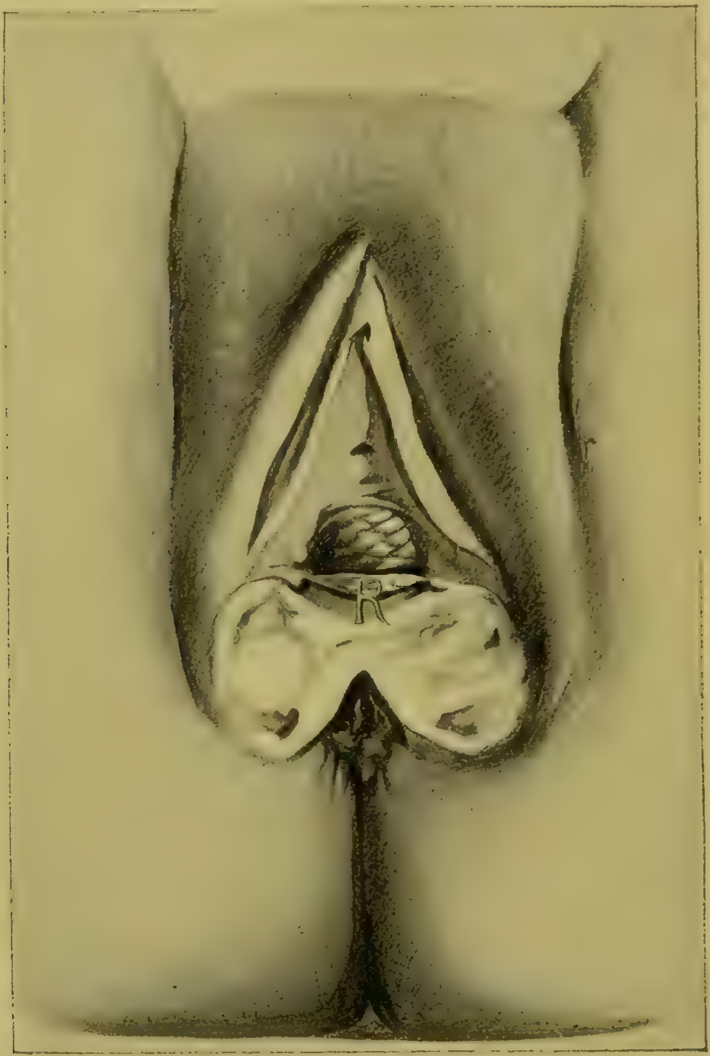


FIG. 83.—Complete laceration of perinæum. Denudation completed. Here the vulva is shown drawn apart much more widely than in Fig. 86. The flap (R) left from the rectocele is raised. The scar tissue between the sphincter ends has been removed. The depressions indicate the ends of the sphincter.

The process of vivifying should be begun by seizing the end of the muscle on the patient's left. With the scissors a strip of tissue should be removed from that point around the tissues between the rectum and vagina, and downward and outward to and including the end of the muscle on the right. When this is done, it will sometimes be found that the softer tissues rise above the depressed end of the muscle, so that a fossa is formed on each side. Should this occur, more of the most prominent tissue should be removed. The denudation is then carried upward upon each side to the point where the laceration began. If there is much relaxation of the rectal and vaginal walls, the denudation may extend even higher on the sides.

At this stage of the vivifying there are two broad denuded surfaces (one on each side), connected by an isthmus formed by the recto-vaginal walls. In this septum all scar tissue should be cut away, and then the rectal and vaginal walls should be separated with the handle of a scalpel or blunt-pointed scissors. The object of this dissection is to give a broader surface to be united, and to permit the vaginal wall to be raised up and attached to the inner side of the perineal body, as it is called. When the vivifying is completed the parts appear as represented in Fig. 83. There are ordinarily two sets of sutures used, one to coaptate the rectal wall and sphincter-ani muscle, and the other to do the same for the perinæum. The rectal sutures are introduced first. I used No. 2 catgut and the curved Emmet needle. The needle is entered at the margin of the rectal mucous membrane on the patient's right side, and is carried upward and outward in the tissues about a quarter of an inch. It is then withdrawn and entered on the left side, and brought out in a manner corresponding to the course which the needle traversed in the right side. This leaves the ends of the sutures to be tied on the inside of the rectum.

In introducing the first perineal suture, the point of the needle should be entered at the inner and lower point of the vivified surface, then carried outward around the end of the muscle, then inward through the recto-vaginal wall, and finally around the other end of the muscle to a point directly opposite the one where the needle was introduced. This requires skill and practice, and is often difficult; and I have found it easier to pass the needle around the ends of the muscle and bring it out in the median line, reintroduce it, and carry it around the other end of the muscle. The objection made to this method is that the central portion of the suture is exposed, but the suture is completely buried in the tissues when it is tied. Certainly it is better to introduce the first suture accurately in this way than to attempt the more difficult way and fail to get it right, a result usual to those who are not accustomed to this operation. The second suture may be introduced in the same way. The remaining sutures are employed in the way described in the operation for restoring the laceration in the first degree. Figs. 84 and 85 show the sutures in place.

Certain changes are necessary to be made in the details of the operation in those rare cases in which the laceration of the recto-vaginal septum has extended so high up that an operation for its restoration is necessary before restoring the sphincter-ani muscle and the perinæum. Another condition requiring similar treatment is found in cases in which the septum has been extensively lacerated,

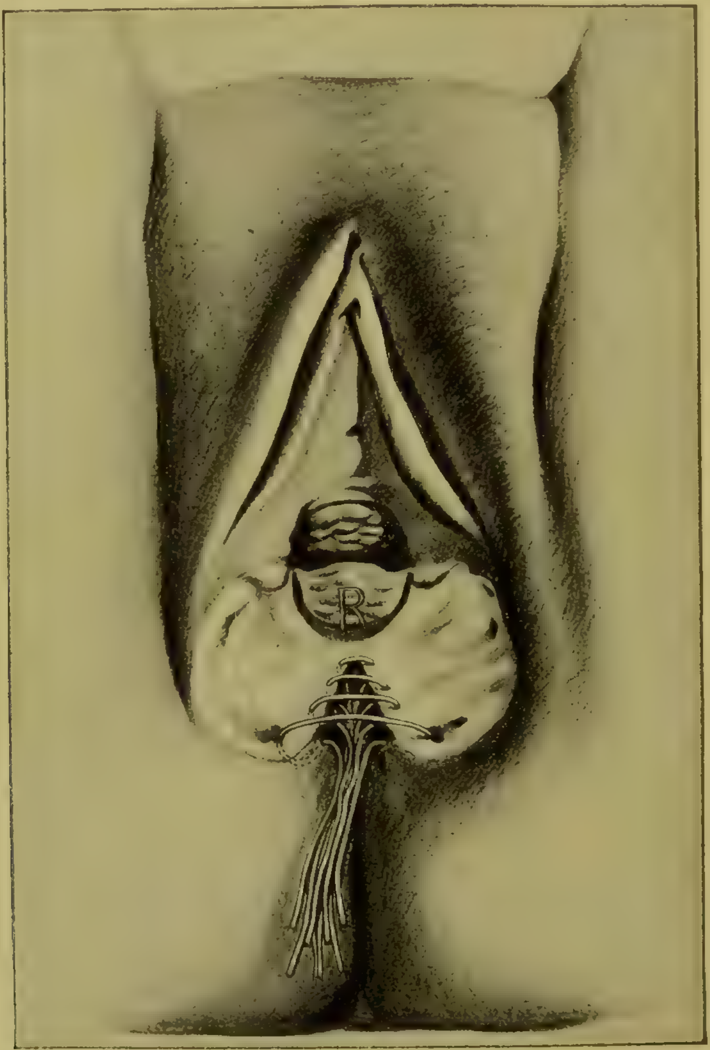


Fig. 84.—Complete laceration of perinæum through sphincter. The sutures in the rectal wall introduced. For the sake of clearness some have been omitted.

but has united by intervening scar tissue, which has to be removed to secure a perfect restoration.

Under such circumstances, and also in cases in which the rectal and vaginal walls can not be separated by dissection, it is better to unite the vaginal wall in the median line by a special row of sutures running parallel to the axis of the vagina. In such cases three sets of sutures are necessary: One to unite the rectal wall, one to unite the perinæum, and one to unite the vaginal wall. In performing this modified operation, I usually vivify the edges of the laceration of the septum the entire length and then introduce the rectal sutures and be-

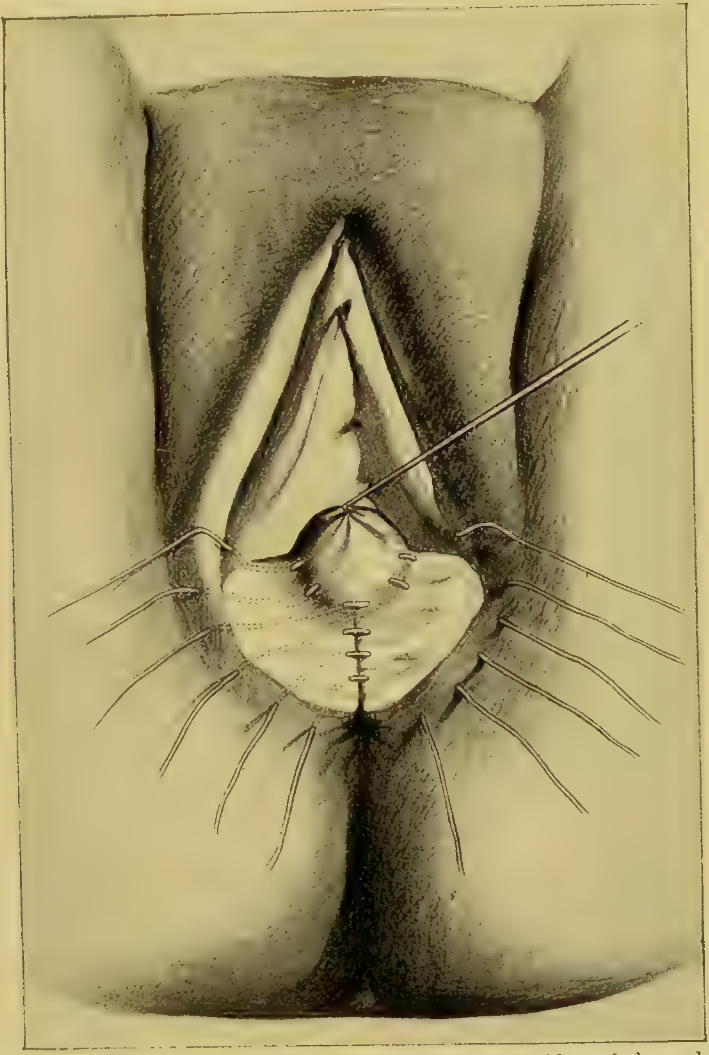


FIG. 85.—The rectal sutures have been tied on the rectal side and the ends cut short. The remaining sutures are in place. The flap from the rectocele is lifted by a tenaculum.

fore tying them vivify all the rest of the parts to be united. The stitches are introduced into the vaginal wall and the perineal stitches placed last. The patient is put into Sims's position and the rectal sutures are tied. She is replaced upon the back and the vaginal sutures are tied, and lastly those in the pelvic floor.

I have obtained the very best results from this method of operating, and in suitable cases prefer it to all others. Further details of the operations will be brought out in the following history of cases:

Typical Case of Laceration extending through the Sphincter Ani.—The patient was twenty-six years old when she was confined with her first child. The labor was tedious, and she was delivered, with forceps, of a very large child, which died during delivery. She made a rather slow recovery, owing to the extensive injury to the floor of the pelvis. Five months after confinement I saw her for the first time. She was then in very good health, but suffered pain in the region of the injury, especially when she walked, and she had very little control of the rectum. When constipated, she suffered very little; but, when the bowels were free and when there was flatulence, she was obliged to remain secluded.

I found that the laceration involved the sphincter-ani muscle, and evidently had extended upward into the wall of the rectum and vagina; but union had taken place, by a little intervening scar tissue, down to the sphincter, or within a quarter of an inch of it. The muscles of the pelvic floor, excepting the sphincter and transversus perinæi, acted well, and held the divided sides well up. The end of the rectum was also drawn upward and forward, so that the distance from the vestibule to the posterior margin of the anus was less than normal. This brought the posterior wall of the vagina up to the anterior, so that the vagina was closed. It was only by placing the finger in the rectum and pressing it backward that the full extent of the laceration became apparent. She was constipated, and her tongue slightly coated, at this time. Pil. hydrarg., gr. x, and pulv. ipecac., gr. j, were given at bedtime, and a wine-glass of Hunyadi-Janos water an hour before breakfast next morning. This moved the bowels freely, and they were kept free for the subsequent two weeks with the following:

Fluid extract of podophyllum....................	ʒj;
Tincture of colocynth..............................	ʒij;
Tincture of belladonna............................	ʒj;
Glycerin..	℥ss.;
Syrup of acacia and compound tincture of cardamom, of each..	℥j.

A teaspoonful of this noon and evening before meals. When this acted too freely, only one dose was given.

During these two weeks the nurse passed the finger every day into the rectum and pressed the parts back toward the coccyx, maintaining the traction steadily for several minutes. This was done for the purpose of restoring the elasticity of the tissues, and also elongating the divided sphincter muscle as much as possible. Menstruation then began, and no further local treatment was employed until after it stopped, when it was resumed. Four days after the menses ceased, the operation was performed in the prescribed way, silk sutures being used. For twenty-four hours before the operation, and for three days after, the patient had only fluid food—beef-tea, strained soups, whey, and water. After the third day, peptonized milk, strained oatmeal and barley gruels, and raw oysters were added to the diet list.

There was sufficient pain during the first three days to require ten drops of liquor opii comp. to be taken every four hours. On the fourth day she suffered from flatulence, which was relieved by catheterizing the rectum, using a silver catheter; this had to be repeated the following day. On the eighth day (and before the sutures were removed) half an ounce of sulphate of magnesia in peppermint-water was given before breakfast and toward noon; when the patient felt the bowels inclined to move, half a pint of solution of ox-gall and water were used as an enema. When this had been retained about twenty minutes, the nurse assisted the evacuation of the bowels by making pressure upon each side of the wound opposite the first suture, and, with the index-finger of the other hand in the vagina, she made gentle and interrupted pressure downward and outward. In this way it was hoped that the rectum would be evacuated without disturbing the wound. There was not the slightest trace of hæmorrhage, which gave reason for believing that no harm had been done.

On the ninth day all the sutures were removed, and on the tenth day the bowels were moved in the same way as before. During all this time the catheter was used to draw the urine. After this the patient was permitted to urinate in the prone position. Every second day until the twentieth the bowels were moved, the same care being taken by the nurse to guard the wound during the evacuation. On the twentieth day the wound was carefully examined, and there was apparently perfect union throughout, including the mucous membrane. The function of all the muscles of the pelvic floor was restored, except that of the sphincter ani. The function of that muscle was, however, sufficiently restored to give the rectum retaining power, but it did not act as a perfect sphincter muscle. When it acted, the contraction was not equally toward the center, but rather toward the point of rupture that had been restored. The posterior portion of the perineal body acted like a fixed point, toward which the muscle contracted. I am inclined to believe that this is the best result that can be obtained by this operation. After the new reparative tissue which is developed during healing has fully contracted, the function of the muscle becomes more nearly restored. Indeed, it is in many cases quite perfect so far as controlling the rectum is concerned, but it rarely, if ever, acts exactly as it did before injury —i. e., by a perfect concentric contraction.

A Case illustrating Partial Failure of the Operation; a Second Operation completing the Cure.—The patient was thirty-five years old, and had had three children. The youngest was eighteen months old at the time when this history was taken. Her first labor, five years and a half ago, was complicated. The patient stated that the doctor in attendance said that there was a shoulder presentation, that the child was turned and delivered feet first, and that the forceps was used to deliver the after-coming head. From that time onward she had no control of the rectum, and the only way she was able to take care of herself was by being extremely constipated, the bowels never moving except in response to medicine, a dose of which she usually took about once every week. The extent of the injury was exactly like the case last given, excepting that there was union of a thin band of vaginal mucous membrane, which extended outward to the upper margin of the sphincter-ani muscle. There were also two hæmorrhoidal tumors, formed by hyperplasia of the rectal mucous membrane, located at each side of the anus. These hæmorrhoids, which are not uncommon in this injury, were removed one month before the restoration of the lacerated parts was undertaken. The mode of operating was by seizing the tumors in a Péan forceps and making traction sufficient to raise the mucous membrane, then passing the hæmorrhoid-clamp (Fig. 86) beneath the forceps, and slowly

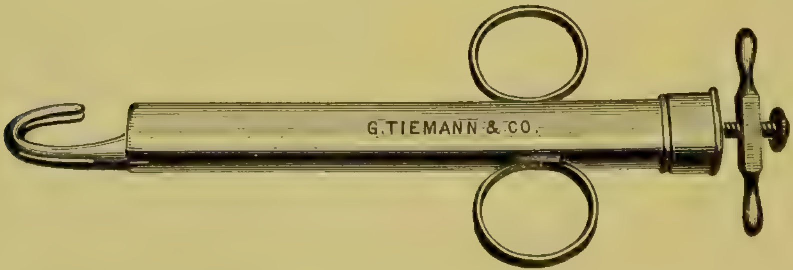


Fig. 86.—Hæmorrhoid clamp.

constricting the pedicle by tightening the clamp. A ligature of prepared silk was applied to the pedicle under the clamp. The forceps and clamp were then removed, the tumor clipped off far enough outside of the ligature to prevent its slipping, and the stump touched with carbolic acid. The ligatures came off in less than a week, leaving a very minute spot to heal. She was then submitted to about the same preparatory treatment as in the last case related, and the operation was performed as before described. The diet was gruel and peptonized milk, with beef-tea. On the second day half an ounce of Rochelle salt was given, followed in three hours by an enema of half a pint of a solution of ox-gall, and, one hour later, a large enema of soap-suds. This did not move the bowels; on the following morning half an ounce of castor-oil was given, and in the afternoon the enema repeated as on the previous day; the enema came away, but the bowels did not move. The next day, she was ordered a mixture composed of a decoction of senna, one ounce to a pint of water, with one ounce of Rochelle salt. Of this, two ounces were given every hour until she had taken three doses. It produced a free evacuation, without causing pain in the wound or doing it any harm. The mixture was repeated in the same way with a like effect, and was again ordered a third time, but, by an oversight of the nurse (the case was in a general hospital), it was not given. Another mistake was made the following day, the nurse giving two drachms in place of two ounces of the medicine. On the eighth day after the operation the medicine was given correctly; but, when the bowels were about to move, the nurse, who should have supported the parts, was absent, and the patient got out of bed to use the commode, and had a free movement, attended with pain and some bleeding. Up to this time the wound had progressed quite well in healing, but that unfortunate movement of the bowels, unaided by the nurse, tore the ends of the sphincter-ani muscle apart, and spoiled the operation to that extent. On the tenth day the sutures were removed. There was perfect union, excepting the ends of the muscle. The operation was a complete failure, so far as its main object was concerned. She was kept in the hospital for two days more, when it was found that, although her bowels were easily kept regular—a great improvement on her former state—she had very little more control of the rectum than before the operation.

Three months after this she was again persuaded to try to obtain relief, and she was placed under the care of a more competent nurse, who followed directions regarding preparatory treatment, including the manipulation daily of the sphincter ani, and at the end of a week another operation was performed to restore the sphincter. The stretching of the muscle backward with the finger in the rectum as practiced by the nurse was more effectual than in cases in which the rupture is complete. The part of the pelvic floor which was restored by the operation gave some support to the severed ends of the sphincter, so that when traction backward was made the muscle became considerably elongated; and when the second operation was undertaken the parts were sufficiently relaxed to facilitate the necessary manipulations.

The patient, well anæsthetized, was placed in Sims's position, a small speculum introduced into the rectum posteriorly, and traction made backward, while with a strong tenaculum, fixed in the margin of the anus anteriorly, the ends of the muscle and the intervening tissues were brought into view. The end of the muscle of the left side was seized in the tissue forceps and denudation made from the left to the right end of the muscle. The vivifying included both ends of the muscle and extended upward on the anterior rectal wall about half an inch. The sutures, three in number, were introduced in the same way as in the first operation. Some trouble was experienced in curving the needle around through the tissues, but with the aid of an assistant, who passed his index-finger into the vagina and everted the rectum in front, all the sutures were accurately introduced.

On the third day after the operation a dose of senna and salts was given in the morning, and at noon the bowels were moved in a rather novel way. An apparatus constructed upon the principle of that used by Professor Bigelow for expelling fragments of stone from the bladder was employed to wash out the contents of the rectum (Fig. 87).

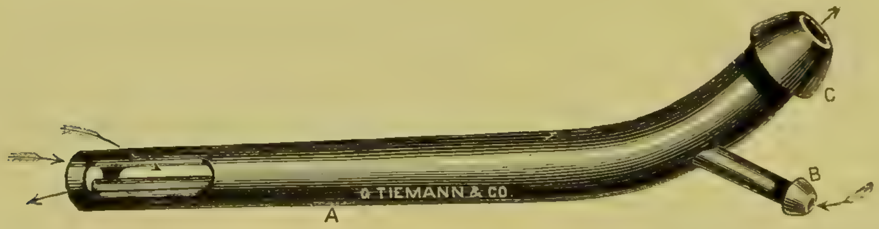


Fig. 87.—A is a hard-rubber rectal tube bifurcated at B C; B, which is the supply tube, is attached to a fountain syringe, and C connects with the evacuator, composed of a soft-rubber bulb, with an escape tube. In other words, it is a large reflux catheter with a rubber bulb in the escape tube for the purpose of facilitating the outflow.

Two nurses use this instrument as follows: One passes the tube into the rectum, carefully making continuous pressure backward to avoid pressing upon the edges of the wound, while the other nurse, closing the escape tube and opening the stop in the fountain syringe, injects the solution of soap and water. When half a pint has been introduced, the supply is cut off and the evacuation tube opened. If the contents of the rectum do not flow out, the bulb is pressed and relaxed after the manner of using a Davidson's syringe. This process is repeated until the bowels are freely evacuated. The bowels were moved in this way until the twelfth day (the sutures were removed on the ninth); after that the bowels were moved daily by the senna and salts. At the end of three weeks the restoration of the muscle was as perfect as could be, and the patient was dismissed with complete retaining power.

This case illustrates the danger there is of the ends of the sphincter muscle being torn apart when the bowels are moved. A skilled nurse, well used to the management of such cases, can do much to avoid this unfortunate accident, and yet when all care is exercised it will often happen. In order to avoid this, several ways have been tried. Keeping the bowels confined for ten or twelve days was the fashion for a long time. More recently some operators have kept the bowels free by laxatives that rendered the contents fluid and procured an evacuation every day after the second day from the operation. I have tried both, and now prefer the reflux-catheter evacuator when a nurse can be obtained who knows how to use it. When this is not possible, I prefer to keep the contents of the bowels soluble and to move them every second day—beginning on the third day after the operation.

When union is obtained, excepting of the sphincter muscle, as in the case just related, and a second operation is performed, some operators prefer to begin *de novo*, dividing the united portion and then proceeding as in the primary operation. I much prefer to keep all that has been gained and to restore the sphincter in the way already described. I was first induced to adopt this method in a case that had been twice operated upon before it came to me with the result of restoring all but the sphincter. So much tissue had been removed that I dared not risk a possible complete failure, hence I attempted to restore the sphincter in the way just described, and with success. My second case of this kind was one in which complete laceration occurred during labor; primary union, without sutures, of the perineal body took place, but not of the sphincter. Since then I have repeatedly operated successfully in such cases of partial failure in my own practice and that of others.

Treatment of the Transverse or Internal Lacerations.—Dr. Emmet was the first surgeon to devise an operation for the relief of this

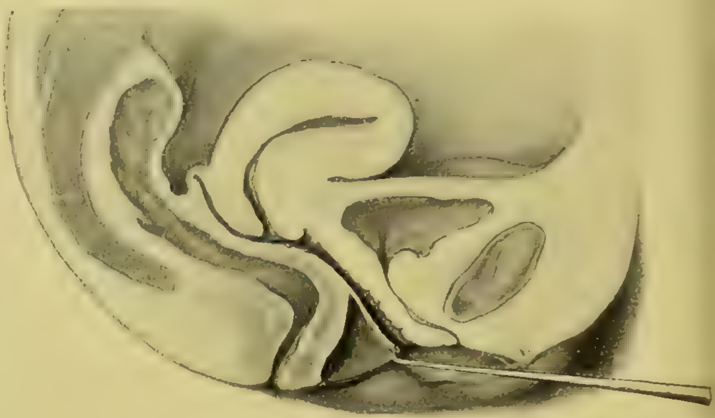


FIG. 88.

injury. I had long observed and comprehended the transverse or internal injury, but never conceived of any method of remedying it until I heard from Emmet. I found that by supporting the pelvic floor during convalescence from confinement, in cases in which this injury had occurred, some effort to repair the injury by natural healing processes was made, and quite successfully in some, but when the injury persisted and the usual pathological changes developed in consequence of this injury, no operation that I had ever tried was really of any service in restoring the structures. As soon as Dr. Emmet gave to the profession his discoveries in this department I saw the great importance of his valuable contribution to this branch of pelvic surgery, and I began at once to practice the operation as best I could. I have found that it meets every indication most fully in cases of transverse internal laceration in which the pelvic floor itself is in perfect condition. The operation is not adequate when the pelvic floor has sustained a subcutaneous laceration, or when atrophy has occurred in the median line from stretching—a common complication of the transverse laceration if permitted to exist for any great length of time. In these conditions I find it necessary to modify Dr. Emmet's method of operating in order to obtain the results required. Moreover, I have obtained better results by treating the so-called rectocele somewhat differently from the way in which it is treated by Dr. Emmet.

In Emmet's operation we are directed to vivify the tissues up to the most prominent part of the rectocele, and then continue the vivifying upward in the vagina on either side beyond the uppermost portion of the rectocele and as far as the laceration of the levator-ani muscle extends. No tissue is removed in the median line from the posterior commissure down toward the anus. So far as the lateral denudation in the vagina and suturing are concerned, I follow the Emmet method. In the median line I remove only tissue enough to liberate the vaginal wall from the pelvic floor and then reflect it upward and backward. I then divide the tissues in the median line down to the sphincter-ani muscle, or down to where I find muscular tissue and fascia; in other words, produce by incision a complete median laceration. The angles in the vagina are then brought together by the sutures down to the muscular tissue of the pelvic floor—that is, down to the bulbo-cavernosus and the ends of the transversus muscle on either side. The muscle, fascia, and integument are then closed by sutures from below upward; the enlarged vessels and cellular tissue are crowded backward toward the rectum and the vaginal wall united to the floor of the pelvis with the sutures, which bring together the lateral edges of the pelvic floor.

By this procedure the muscles and fascia in the median line are restored; the muscular wall of the vagina is attached to the pelvic floor as far back as the rectum and upward to the posterior commissure. By this method the so-called rectocele is completely disposed of and the posterior wall is held downward and backward in its normal position; in other words, made to resume its normal relations to the pelvic floor (see Fig. 60). In this way the essential requisites are obtained: first, the central part of the floor is restored; the so-called rectocele is disposed of without loss of vaginal tissue; the normal relations of the vagina and pelvic floor are established, and the overdistended veins receive more support than can be offered by any other operation known to me. The veins should not be wounded if this can possibly be avoided, either while vivifying the tissues or introducing sutures. If by chance a vein is wounded it should be exsected, or the opening closed with a ligature; this guards the patient from phlebitis and extravasation. The veins can usually be avoided while suturing by separating them from the vaginal wall

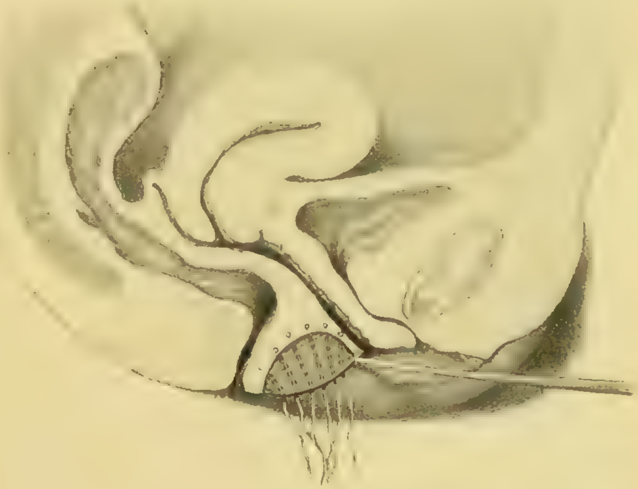


FIG. 89.

and pressing them downward and backward while passing the needle. In regard to the arteries which usually lie just beneath the vaginal wall, no harm comes from dividing them if they are ligated or caught in the sutures; in fact, the closure of the arteries may be beneficial in lessening the blood supply during convalescence, thereby allowing the veins to regain their original caliber.

In addition to the ordinary dressing, a compress and bandage should be applied to support the pelvic floor and prevent traction being made upon the internal sutures while the union is taking place.

I must remark that I use the prepared silk suture in this as in all operations, and here its advantages are very pronounced. Emmet uses silver wire, and any one who has seen the irritation that comes from a number of such sutures in the lower portion of the vagina and the difficulty of removing them needs no argument to convince him of the superiority of silk sutures.

CHAPTER VIII.

FISTULA IN ANO AND COCCYODYNIA.

FISTULA IN ANO.

Fistula in ano in women differs in no wise from the same affection in men, so far as its pathology, symptoms, and physical signs are concerned; and, as these are fully described in treatises on surgery, I shall treat of them here only incidentally. But the treatment of fistula in women has some important peculiarities connected with it, and I propose, therefore, in this chapter to deal with the subject of treatment alone, giving special attention to those points of difference as I have observed them in the two sexes.

Having had several very unsatisfactory results in treating fistula in ano according to the usual methods of surgery, I determined some years ago to seek other means better adapted to the relief of that affection of the rectum. The history of my own failures, and those which I have seen after treatment by other surgeons, may be the best introduction to what I have to say on this subject. My first case, treated in hospital, was a dissipated woman, who did not know her age, but appeared to be about sixty. She had a very severe purulent vaginitis, presumed to be a neglected gonorrhœa, and also a fistulous opening extending from the side of the perinæum, about three quarters of an inch from the mesial line, into the rectum above the sphincter muscle. When the vaginitis was relieved, I treated the fistula by laying it open in the usual way and placing some lint in the wound so as to make it heal by granulation from the bottom; in this I was disappointed. The divided surfaces slowly healed over, but did not unite by intervening granulations or by new tissue. The result was that the divided ends of the sphincter muscle were never united, and the patient lost the retaining power of her rectum. During the healing process applications were made to the parts, in the hope of exciting proliferations to fill in the space, but without avail. The patient, a disgusting creature to begin with, became much worse after the operation.

While I was thinking of some way to restore her sphincter, she was granted leave of absence from the hospital one afternoon, and, promptly getting drunk, was arrested and sent to jail next morning by the police justice, who remembered her of old. What her subsequent history was I do not know, but I do know that I felt relieved when I heard of the disposition made of her by the judge.

The next case of fistula occurred in private practice; it was that of a young lady who broke down from over-taxation and dysmenorrhœa. She had a pelvic abscess and finally a fistula, which I was called upon to treat after her physician had partially restored her health. The external opening of the fistula was situated in the anterior and lateral portion of the perinæum. Owing to my experience with my hospital patient I was unwilling to operate in the same way, but gladly decided to employ the elastic ligature, strongly recommended at that time in the treatment of fistula. Accordingly, I passed the ligature through the canal, and, bringing the end out through the anus, tied it rather tightly. Considerable pain, which caused my patient great suffering, followed, and lighted up many of the old nervous symptoms from which she had just recovered. The ligature cut its way outward rather too rapidly, perhaps, and in six days all the tissues were divided except a very small portion of the skin, which I snipped with scissors. The parts healed over, but the ends of the sphincter muscle did not unite. In fact, the result was about the same as in my hospital case. For a long time the retaining power of the rectum was completely lost. Two years after the operation I examined her, and found that the contraction of the scar tissue had brought the ends of the muscle nearer together, but still the function of the sphincter was imperfect. The patient was unable to retain fluid fæces or gas, although when slightly constipated she experienced very little trouble.

Two other cases have come under my observation, in which the conditions presented were very much like those described in my own cases.

The first one was a lady, thirty-two years of age, married for ten years, and sterile. For three years she had suffered from a painful growth at the meatus urinarius; this gave rise to so great tenderness as to prevent coitus and to cause distress during micturition. The tumor was removed and the parts healed well after the operation, but still she had symptoms of vaginismus which compelled her to return for further treatment. A careful examination revealed the following condition: The perinæum was shorter than normal, and was drawn upward by the action of the sphincter-vaginæ muscle until it nearly closed the introitus vaginæ. The rectum appeared to be also drawn forward, so that the distance from the posterior wall of the rectum to the meatus urinarius was altogether shorter than is usually found. A scar was formed on the right margin of the anus. The function of the sphincter ani was impaired. Upon inquiry, I learned that seven years before she had been operated on for fistula, and had never since had complete control of the rectum.

The other case referred to so closely resembled in history those just given that it need not be related in full. The only point of difference was that this patient sought advice regarding her want of control of the rectum. It will be observed that in all four of these cases the fistulæ were situated either upon the anterior or lateral margins of the anus. A question here arises, whether the operation for fistula situated more toward the posterior margin of the rectum would terminate in the same unfavorable way. This I can not answer, as I have never seen a case; I can not, however, see any reason why it should not do so. I am not disposed to believe that the results obtained in the operation for fistula in ano are always so unfortunate as in the cases recorded here. If that had proved to be the case, the attention of surgeons would have been given to the subject long ago.

That the power of the sphincter-ani muscle is lost in a large number of cases after the operation is, I believe, a fact. I might go further than this and say that, in all cases in which the fistula is located completely outside of the muscle, and it is therefore necessary to divide the sphincter in operating, there is great danger that it will not be fully restored. The divided muscle retracts, and the space between its ends is filled in very slowly with new tissue; as a result, there is usually a large amount of scar tissue necessary to connect the two ends. This must impair its functions, if it does not entirely destroy it.

In a healthy subject in whom the termination of the fistula does not extend far outward, and the induration of the tissues around the canal is not extensive, the healing process may go on rapidly, thus connecting the ends of the muscle by means of intervening new tissue. Under such circumstances, the function of the muscle may be retained; on the other hand, if the fistula extends from high up in the rectum to a point some distance outside of the muscle, the operation is almost sure to be a failure. Of course, the greater the amount of tissue between the rectum and the fistula, the farther will the ends of the muscle be separated by retraction, and the longer will the parts be in healing. In such cases the function of the sphincter is very liable to be impaired. When the fistula is located beneath the mucous membrane only, then a perfect result can always be obtained. Mr. John Gray ("Lancet," December 11, 1880) states that operative treatment should be deferred until the walls of the abscess, as well as the consequent fistulous tract, have assumed a condition of health and a disposition to take on a healing process. This is certainly a good rule in surgery, because it secures, as far as possible, the condition necessary to prevent fecal incontinence. In order to avoid such unfavorable results, it was evidently necessary to operate without dividing the sphincter muscle, or, if that were impracticable, to secure union of the divided ends of the muscle with the least possible quantity of intervening new tissue.

In the hope of curing the fistula without dividing the sphincter, the following method was adopted: An incision was made through the skin and lower part of the sinus large enough to admit two fingers below and one at the upper end of the wound. The edges of the wound were held apart with retractors, and the opening in the rectum was found and brought into view by passing the finger into the rectum and everting the rectal wall through the wound. The edges of the opening in the rectal wall were then pared with the scissors, and two or more catgut sutures were introduced and tied. The external edges of the wound were kept apart by a pledget of carbolized lint, which was changed every day until the wound healed. The idea was to first convert a complete fistula into a blind external one, and then finish the cure by compelling the external sinus to heal from below outward. To prevent any strain upon the sutures by distention of the rectum, I paralyzed the sphincter by overdistention, and kept the bowels free by saline laxatives. Of two cases treated in this way one was a success and the other only partially so, as the opening into the rectum closed, but a blind external fistula remained.

Regarding this method of treating fistula, I can only say that the danger of losing the sphincter muscle is avoided, which is very important, but there are objections to it. The operation is difficult to perform—at least the closing of the opening in the rectum with sutures is not easy—and, then, my impression is that it will fail to cure some cases.

While thinking of some other method of treatment more satisfactory than that given above, I noticed a suggestion in the "Chicago Medical Review," by Dr. Dudley, to lay open the fistula, trim off the indurated tissues along its track, and treat as a lacerated perinæum, with sutures. It occurred to me that this method was deserving of a trial, and I determined to put it to the test of practice as soon as I could get an opportunity. It was, of course, impossible to tell what the results would be, but I thought that it promised as much as the methods which I had used. Such an opportunity presented itself to me, and the result will be seen in the following history:

Fistula in Ano successfully treated by the New Method.—The patient was a married lady, who had anteflexion of the uterus, which caused sterility. On two occasions she had dysentery, which left a tender condition of the rectum and hæmorrhoids. While under treatment for the flexion of the uterus, she had an abscess on the right side of the anus, which terminated in the formation of a complete fistula. The external opening was about an inch from the anus on the right side, and the internal opening was immediately above the sphincter-ani muscle.

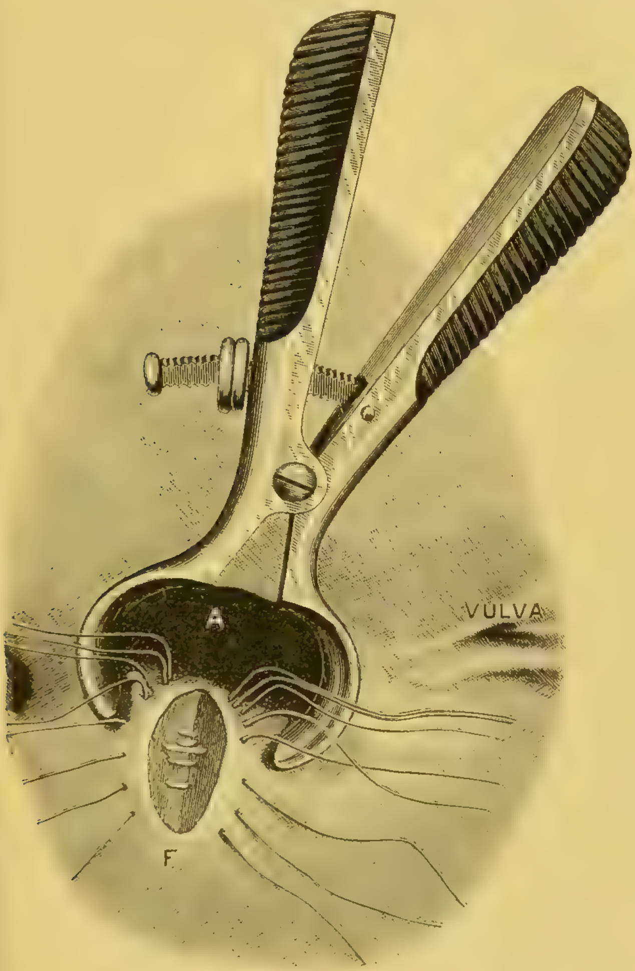


Fig. 90.—The operation for fistula; the tract laid open and the sutures in place. A, anus; F, outer end of fistula.

There was the usual exudation around the fistulous tract, but it was not so extensive as in many of these cases. The rectum having been thoroughly washed out with disinfectants, after a free evacuation of the bowels, a bivalve rectal speculum was introduced and the fistula laid open. The scar tissue was carefully dissected out, and special care was taken to vivify the mucous membrane around the upper opening of the fistula. The ends of the sphincter muscle retracted, so that it was necessary to remove a considerable portion of the mucous membrane and cellular tissue in order to expose the ends of the muscle in the edges of the wound. Fine silk sutures were then introduced into the mucous membrane of the rectum, the lower ones being made to include the sphincter-ani muscle.

Deep sutures were then introduced from the outside upward in the same manner as in the operation for restoring the perinæum. Fig. 90 shows the sutures in place. The deep sutures were tied first, and the slight traction upon them drew the tissues downward and shortened the length of the wound very much. This brought the sutures in the mucous membrane very near together. I should have stated that before the fistula was laid open the sphincter-ani muscle was stretched until paralyzed; this prevented any tension upon the sutures for the first few days.

The bowels were moved daily, and after each evacuation the rectum was washed out with carbolized water. There was a little suppuration in the track of one deep suture, but union was complete in ten days. The deep sutures were removed on the ninth day, and the sutures in the mucous membrane were removed at the end of two weeks.

The recovery was perfect, the function of the sphincter muscle being fully restored.

COCCYODYNIA.

This affection was first described as a neuralgia of the coccyx by Dr. Nott in the "North American Medical Journal," May, 1844, but it attracted little attention until 1861, when Sir James Y. Simpson revived the subject and gave it the name which it now bears.

Pathology.—Pain upon moving the coccyx and contracting the muscles attached to it is the chief characteristic of this disorder. The morbid conditions found are variable. Fracture and dislocation of long standing and caries of the coccyx have been discovered in some cases; in others, no appreciable lesions can be detected. It is presumed that, in the absence of structural changes of the bone and muscles, the pain may be due to rheumatism of the tendons of the muscles or neuralgia of the nerves distributed to them.

Symptomatology.—There is little or no suffering while the patient is at rest, but upon rising, sitting down, or evacuating the bowels, pain over the coccyx is experienced. Sitting is painful in some cases, owing to pressure upon the bone. Any sudden movement is attended with suffering. Some patients are unable to rise from a low seat without assistance.

Physical Signs.—Tenderness upon pressing and moving the coccyx is the chief diagnostic sign. Painful hæmorrhoids, fissure of the anus, and spasm of the adjacent muscles caused by ascarides in the rectum, may be mistaken for this affection, but they can be excluded by physical examination.

Prognosis.—Some cases of coccyodynia are slight, and wear away in time without special treatment; but, though the disease may not perceptibly injure the general health of the patient, it is often of such long duration, and occasions so much suffering and inconvenience, that it is necessary to resort to surgical means for relief.

Causation.—Women who have borne children are the most frequent, though not the only, sufferers from this disorder. Injuries sustained in parturition, or blows upon the coccyx, exposure to cold, and diseases of the ovaries and uterus, are its chief causes.

Treatment.—The surgical methods of treatment are those practiced by Prof. Simpson and Dr. Nott. Neither of them is dangerous, and one or the other is certain to give satisfactory results.

By Prof. Simpson's method an ordinary tenotomy-knife is inserted at the lowest point of the coccyx, and passed flatwise between the skin and cellular tissue till its point reaches the junction of the sacrum and coccyx. Then the knife is turned and withdrawn, making a subcutaneous incision which entirely severs the muscles over one side of the coccyx. The same operation is repeated on the other side. No hæmorrhage is to be feared in subcutaneous operations unless some large vessel should be cut.

An easier operation, and one more likely to effect a cure, is performed by exposing the coccyx through an external incision, raising the extremity of the bone, and severing the muscles with a pair of scissors. The subcutaneous operation, always difficult, is nearly impossible where the bone is covered with much adipose tissue.

Should the bone itself be diseased, section of the muscles would not effect a cure. In such cases the coccyx must be laid bare, disarticulated by the knife, and amputated, according to the method of Dr. Nott.

The complete removal of the coccyx is the only method which has proved satisfactory in my practice. Nott's method of operating is to expose the coccyx, detach the muscles, and then take it off from the sacrum with the bone-forceps. In this operation there is danger of injuring the sacrum, and causing a subsequent necrosis. I therefore prefer to disarticulate with the knife or scissors, cutting through the cartilage.

While all my operations have been finally successful, I have several times seen great suffering and slow healing follow.

The subjoined cases will illustrate the pain and suffering which may follow the operation.

ILLUSTRATIVE CASES.

Removal of the Coccyx and Lower Segment of the Sacrum; Recovery.—A married lady, twenty-four years of age, was thrown from a carriage and injured by falling upon her back and side, bruising the lower end of the spine, and having what was supposed to be a fracture of the neck of the femur. After recovering from the immediate effect of the accident, she suffered from severe pain in the coccyx. At first the pain in that region was almost continuous, and greatly aggravated by locomotion. For about six months from the time of her accident she was tolerably comfortable while resting, but suffered greatly when moving around, especially upon rising from a chair or sitting down or turning in bed. She also had severe attacks of sick headache and pains in the back of the neck.

On physical exploration it was found that the coccyx and lowest segment of the sacrum projected inward at nearly right angles to the axis of the sacrum. In this dislocation the coccyx was firmly fixed. The dislocation and the tenderness gave rise to violent pain on defecation.

The operation consisted in removing the coccyx and the lowest segment of the sacrum. A free incision was made and all the muscles and attached ligaments were separated, and then the part to be removed was carefully disarticulated without any injury to the bone. The operation was done with all antiseptic precautions, all hæmorrhage was controlled, and the edges of the wound were brought together with sutures, and dressed with absorbent cotton.

On recovering from the anæsthetic she complained of the most agonizing pain in the lower half of the back, pelvis, and limbs. This pain continued for the first three days, and was only partially controlled by large hypodermics of Magendie's solution, ten minims, every two to four hours.

An effort was made to relieve the pain with opium given by the mouth, but, although seven grains were given in twelve hours, it was necessary to repeat the hypodermics to give her relief. During all this time of suffering the wound appeared to be healing, there was no undue inflammation, and no suppuration. Five days after the operation the pain was more easily controlled by the morphine, and then the sutures were removed, and the pain from this time onward diminished quite rapidly. At this time the wound appeared to be completely healed, but a portion of the cicatrix broke down, and subsequently healed by granulation. From this time on her progress was entirely satisfactory, the pain subsided in the neighborhood of the wound and spinal column, and she was entirely relieved from her sick headaches.

Removal of Coccyx; Extreme Pain after Operation; Delayed Healing of the Wound; Final Recovery.—This was a married lady who had one child about eight years old. She had suffered from pelvic cellulitis following miscarriage, so that her health was very much impaired. She fell down-stairs and injured her coccyx about two years before she came under my observation.

She recovered completely from her pelvic cellulitis. She developed all the symptoms and physical signs of coccyodynia. The operation was performed in the usual way, and every care taken to secure a good result. After ligating the small vessels, which bled rather freely, there was a little serous oozing, so, before closing the wound with sutures, I introduced a few strands of catgut for drainage, and dressed the wound with borated cotton.

From the time of the operation she had a great deal of pain and tenderness in the region of the wound; this pain and tenderness increased until it was necessary to give anodynes liberally to relieve them. After about five days the violent pain subsided, but the wound was still exceedingly sensitive; the drainage-threads were removed about the second day, and the sutures at the end of one week. The union was complete, except a sinus in the center which extended downward the depth of the original wound. This promptly closed up after a few more weeks, but there was still great tenderness remaining there. She returned to her home thirty days after the operation, with the wound apparently healed but still tender. She was free from her occipital headaches and from most of her distressing symptoms.

Some time after her return home the wound reopened, and, although every care was taken of the case by the physician in charge, it was nearly six months before it healed entirely. Through all this time she was free from the suffering which she had before the operation, but the wound was still tender. Since then she has been perfectly well.

Fissure in Ano.—This patient was suffering from a small fissure or ulcer in one of the folds of the mucous membrane within the grasp of the sphincter-ani muscle. The fissure was exposed with the aid of the rectal speculum. The cautery was placed at the upper end of the fissure and heated, and then drawn downward through the surface, and the diseased surface was completely but very superficially cauterized. The cautery in these cases should be very lightly applied to prevent deep destruction of the tissues, which would cause a slough and retard healing. In many cases, when the ulceration is very superficial, I do not touch the parts with the cautery at all; only hold it near enough to produce the effect desired by the radiated heat.

CHAPTER IX.

INFLAMMATORY AFFECTIONS OF THE UTERUS.

ANATOMY OF THE UTERUS.

Before taking up the various forms of endometritis, a few words regarding the anatomy and physiology of the uterus will aid in making clear what follows with reference to the pathology and physical signs of this variety of uterine disease. The uterus is a triangular body with its apex below when in its normal position in the pelvis. It varies in size in different persons, and is somewhat larger in those who have borne children than in virgins. Its entire length is about three inches; the width from the entrance of one Fallopian tube to the other, that is, the base of the triangle, is about two inches; and it is about one inch in thickness. It is divided into the fundus, body, and cervix, the cervix being about as long as the body and very nearly as thick. The cervix is divided into the intravaginal and the supravaginal portions, the former being that part which projects into the vagina, and the latter that which extends from above the vagina to the body of the uterus.

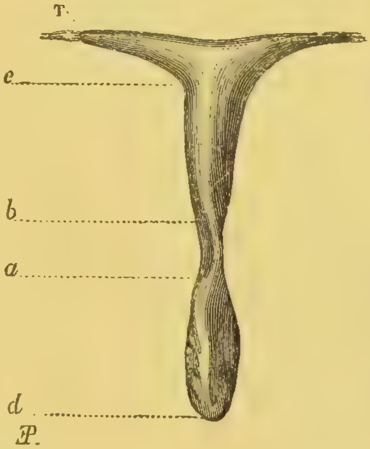


Fig. 91.—Mold of uterine cavity in the virgin (Guyon): *a*, os internum; *d*, os externum.

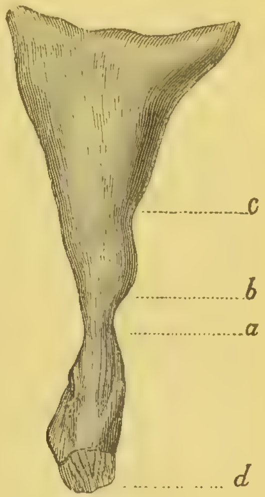


Fig. 92.—Mold of uterine cavity in the multipara (Guyon).

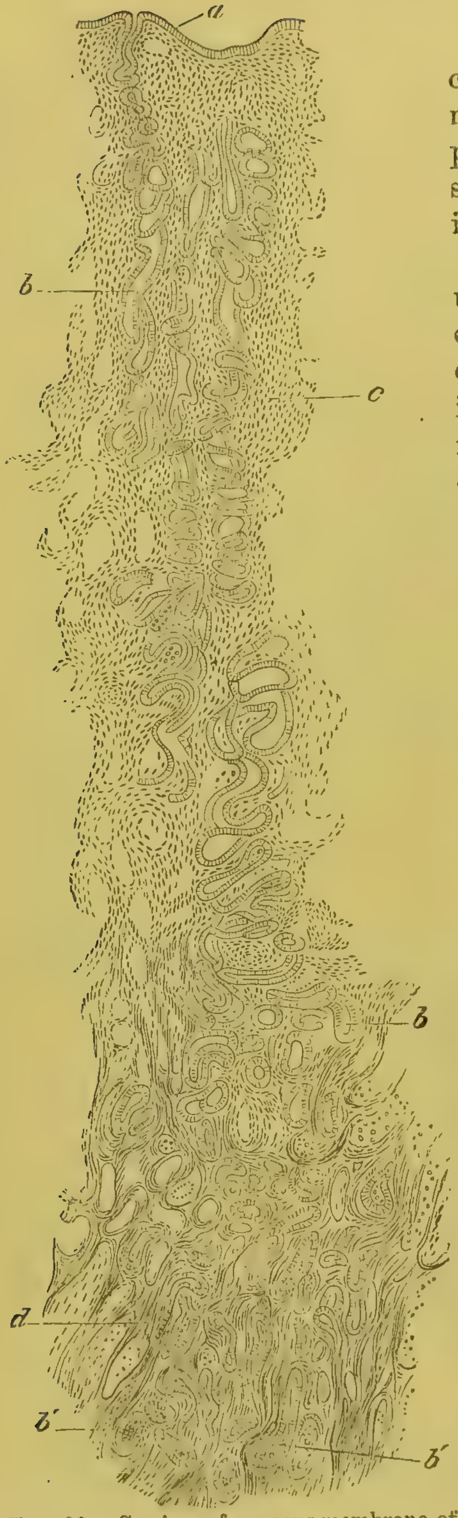


Fig. 93.—Section of mucous membrane of uterus from near the fundus (Schäfer): *a*, epithelium of inner surface; *b*, *b*, utricular glands; *c*, connective tissue; *d*, muscular tissue.

The walls of the uterus are composed of three distinct elements: the outer covering being peritoneal; the middle coat, unstriped muscular fiber; and the internal, mucous membrane.

The peritonæum covers the uterus only partially, but the mucous membrane lines the entire cavity of the body and cervix, and is continuous with the mucous membrane of the vagina, although differing decidedly in structure. Reference will be again made to the relation of the peritonæum to the uterus.

The cavity of the uterus and its mucous membrane, which are of special interest in this connection, are divided into the cervical canal and its membrane and the cavity of the body and its membrane. The cavity of the body is triangular and curvilinear, while the canal of the cervix is spindle-shaped. Outlines of the cavity of the canal of the uterus differ in the parous and imparous uterus (Figs. 91 and 92).

The constricted portion at the junction of the body and cervix is the os internum, and the termination of the canal below is the os externum. Taking the cavity of the uterus in its entirety as representing a triangle, with an opening at each of the angles, we find at the upper angles the openings of the Fallopian tubes, and at the lower angle the os externum.

The mucous membrane of the cavity of the body is smooth and thin, the membrane proper not being more than the one twelfth of an inch in thickness. It is composed of an epithelial and basement layer, and is firmly united to the fibrous tissue of the middle wall and connective tissues. It is covered with a single layer of columnar epithelium, each epithelial cell having on its free surface a bundle of cilia. It contains a number of glands known as the utricular glands. In a section of the mucous membrane these glands can be seen with a microscope to be lined with ciliated, columnar epithelium, and to have free openings on the surface of the membrane. They dip obliquely downward, and end in the connective and muscular tissues immediately beneath the membrane.

Some of the glands are simple- others are bifurcated at their lower ends; sometimes two of these glands have one opening on the free surface.

I have said that the glands dip down into the muscular fibers of the middle coat; others describe the muscular fibers as running up between the glands, which amounts to the same thing. This arrangement of the utricular glands in the mucous membrane and the muscular wall of the uterus, with the intervening connective tissue, can be seen by referring to Fig. 97. The differences in the infantile and senile uterus can be seen by reference to Figs. 94 and 95.

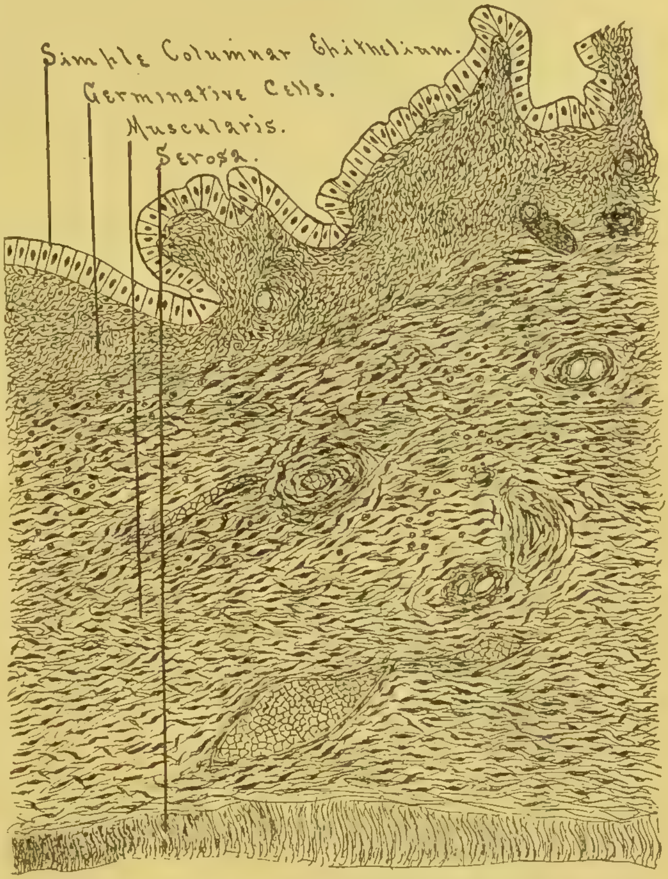


FIG. 94.—Transverse section through middle portion of the corpus uteri of an infant 7 months old.

The mucous membrane lining the cervical canal is arranged in an entirely different manner from that of the cavity of the body. From the internal to the external os there are sulci which divide the membrane into four divisions or columns. The membrane between these sulci is arranged in oblique folds or ridges, the whole making up that rugous appearance to which the name *arbor-vitæ* has been given. Fig. 96 shows this peculiar arrangement of the membrane. This membrane is covered throughout with ciliated epithelium. The glands of the cervix, known as the glands of Naboth, are of the racemose type; they open on the free surface, dip down, and divide into numerous branches, which extend deep into the connective tissues. Their openings are found on the surface of the mucous membrane, both in the elevations and depressions.

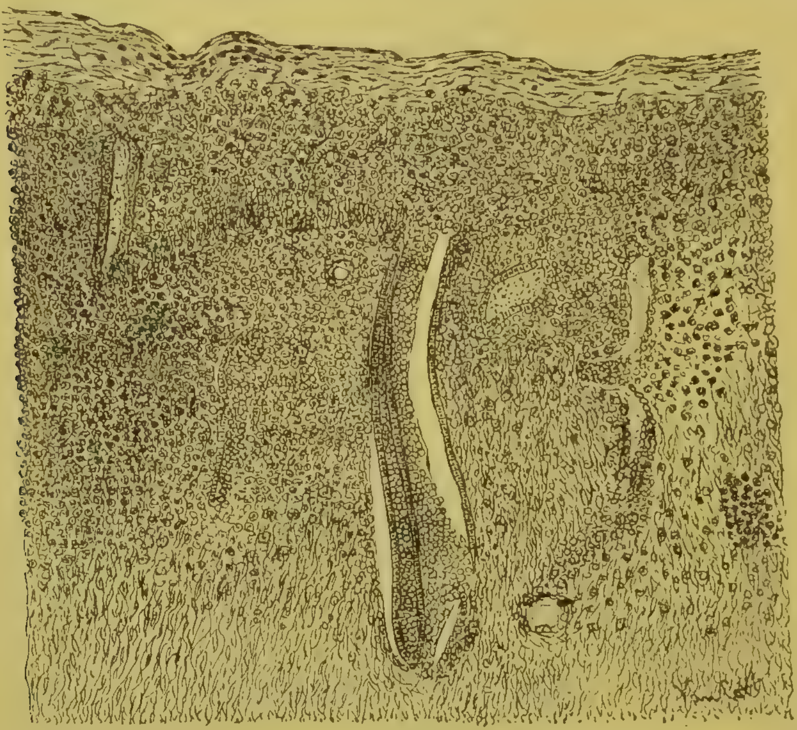


FIG. 95.—Transverse section through the middle portion of the corpus uteri of a woman aged 83.

The point at which the mucous membrane of the cervical canal unites with the membrane which covers the vaginal portion of the cervix is the os uteri externum, and the structure and arrangement of the membrane differ on the two sides of this dividing line. That within the canal is as I have described it, and that which covers the cervix outside of the os internum contains none of the glands of Naboth, and has all the general characteristics of the mucous membrane of the vagina. It consists of vascular papillæ covered with many layers of squamous epithelium. When, as occasionally happens, the Nabothian glands are found upon the vaginal surface of the cervix, it is evidence that they have either been developed there or else there is eversion of the mucous membrane of the cervical canal, and the latter, I believe, is the true explanation of their presence in most cases.

The middle or muscular wall of the uterus is composed of non-striped muscular fibers which appear to be rudimentary in the unimpregnated uterus. This middle coat is divided into three layers: a thin subperitoneal one which is continued outward in the location of the uterus, a middle layer, and an inner concentrated and very abundant layer which surrounds the Fallopian tubes, os externum, and os internum; the inner portion of this layer is less dense than the rest of it, and there is more connective tissue intermingled with the fibro-muscular tissues. It is into this layer that the uterine and Nabothian glands extend.

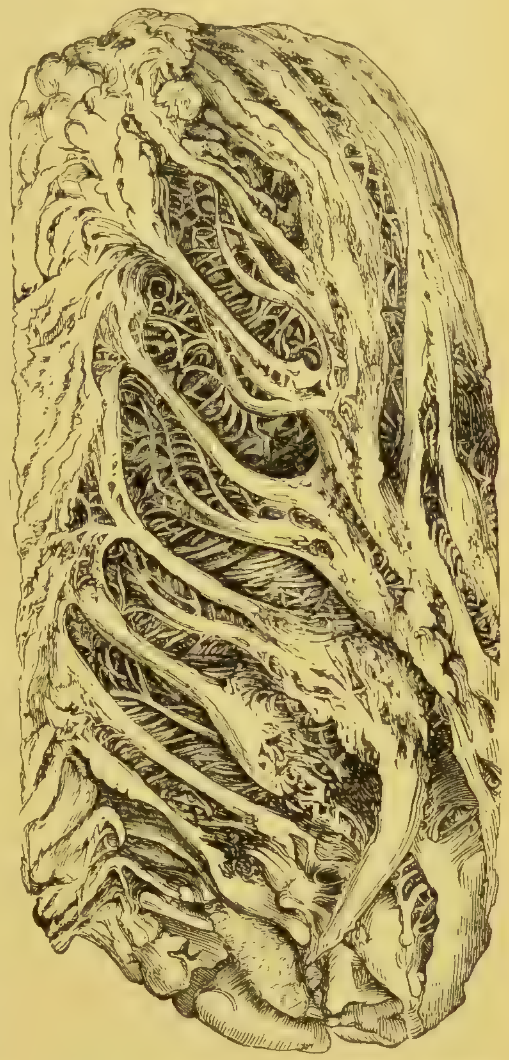


Fig. 96.—The oblique ramifications of one of the median columns in the cervical canal of a virgin, called the arbor-vitæ (9 diameters).

FUNCTIONS OF THE UTERUS.

The function of the uterus which is of most interest to the gynecologist is that of menstruation, which has been discussed in the third chapter, to which the reader is referred. It will be spoken of again when treating of corporeal endometritis.

The function of the cervix in relation to gestation and parturition need not be discussed here; a few words, however, may be appropriate in regard to the relation of the cervix to impregnation.

There are two principal theories in reference to the function of the cervix uteri in the transmission of the fecundating element to the body of the uterus. The one is that the cervix dilates, and that the secretion of the glands of Naboth fills the canal and forms a medium through which the spermatozoa make their way upward by their own migrating power. This appears rational from the fact that the secretion of the Nabothian glands is, in its physical properties, similar to the seminal fluid. The other theory is, that the cervix expands, extends, contracts and retracts, producing an action of suction, whereby the spermatozoa are carried up into the uterus. Whether either or both of these theories is correct, there is no doubt that the glands of Naboth secrete a fluid that is concerned in the great function of reproduction, and that derangement of this function tends to the development of cervical endometritis, and that they are subject to important pathological changes in that affection.

INTERSTITIAL METRITIS AND ENDOMETRITIS.

Interstitial Metritis.—This is always acute, and occurs either in the puerperal state or in connection with fibromata or other uterine neoplasms. Puerperal metritis is of the most interest to the obstetrician, as it occurs in connection with parturition. It has a traumatic or septic origin, and usually involves the entire uterus, so that changes of structure are found in the mucous and muscular coats of the organ, constituting both interstitial metritis and endometritis. This, when it terminates in recovery, tends to chronic inflammation of the mucous membrane. The process of involution is arrested by this inflammation, and when the tissues are changed by inflammatory action the uterus is not only larger than it should be, but is changed in structure. This will be referred to again under the head of subinvolution.

Endometritis.—This occurs in two forms, cervical and corporeal, both of which may be either acute or chronic. In the course of the eruptive fevers, measles and scarlet fever, corporeal endometritis sometimes occurs; this form is known as exanthematous endometritis. It is usually an acute affection, which subsides after recovery from the constitutional disease which causes it; sometimes, however, when it occurs in the young the uterus is damaged to such an extent as to arrest its development. This is, I am sure, the cause of many cases of imperfect development of that organ.

The acute form of the affection may in exceptional cases become chronic.

Endometritis due to gonorrhœal virus will claim a separate notice, and with these few observations I shall for the present dismiss all the varieties except acute and chronic endometritis, which will be discussed in this chapter.

Acute Endometritis.—Acute endometritis is exceedingly rare if puerperal, gonorrhœal, and septic inflammations are excluded. I am aware that acute cervical or corporeal endometritis is described in books, and Thomas claims that the affection occurs frequently; but my own observations lead me to the conclusion that it does not progress beyond the stage of acute congestion, and frequently passes off without causing the slightest permanent change of structure. Occasionally the acute stage subsides, and a chronic or subacute endometritis follows. When one follows the other in this way they stand to each other in the relation of cause and effect. The disease may affect the cervix or the body or both at the same time.

Acute Cervical Endometritis is more properly an acute congestion, which does not cause any very marked disturbance either of the pelvic organs or the general system. The symptoms are not pronounced. Pelvic tenesmus of a slight nature, a sense of aching in the pelvic region, with or without backache, is the evidence obtained at first, and then leucorrhœa soon follows. This discharge is usually catarrhal and non-purulent. In some cases there is also a vaginitis and a vaginal leucorrhœa which contains some pus-cells, but when there is a free purulent discharge there is room for a suspicion that the cause may be specific.

This form of cervical endometritis frequently ends in recovery, but may become chronic. All else that needs to be said on this subject will be given in the consideration of corporeal endometritis.

Acute Corporeal Endometritis.—Acute corporeal endometritis may occur alone, but I have always found it accompanied by more or less cervical endometritis.

The pathology of acute non-specific endometritis I consider to be a hyperæmia, with such derangement of function as may come from it. This congestion may lead to swelling of the mucous membrane, destruction of its epithelium to some extent, and the formation of pus, but these changes are not so marked as they are in metritis due to specific causes. There is derangement of the menstrual function; the flow may be retarded, anticipated, profuse, or scanty.

A free menstruation is usually very beneficial. Symptoms often subside as soon as a free flow is established, and if this flow continues the usual time or longer the patient promptly recovers. Free menstruation has always appeared to me to be a natural means of relief in this affection.

The symptoms and physical signs of cervical and corporeal acute endometritis are similar to those found in the chronic form of the affection, and to save repetition these points will be taken up under the head of chronic endometritis.

Prognosis.—This is favorable. The great majority of cases recover, and the worst that may happen is that the disease may linger and assume the chronic form.

Causation.—The causes which give rise to ordinary inflammation of mucous membranes generally will produce acute endometritis, especially if operative at or near the menstrual period. Extreme sexual excitation or over-indulgence, exposure to cold, over-fatigue, and injuries from careless examinations with the touch or instruments, are fair examples.

Treatment.—Complete rest is the first and most important element in the management. To quiet the nervous system, full doses of bromide of sodium should be given. This may also relieve pain. Should the suffering still persist, opium should be used, but not if it can be avoided with justice to the sufferer.

Hot applications should be made over the hypogastrium. Linseed-meal poultices, covered with oil-silk, should be preferred, but if the patient complains of the weight, flannels wrung out of hot water may be used in the same manner. The hot-water douche should be used twice or three times a day if it gives relief. The bowels should be kept free with saline laxatives; should these cause flatulence and pain, a laxative pill of colocynth or rhubarb and belladonna will answer better.

This simple treatment is generally sufficient. More heroic measures are often resorted to, but usually with the result of prolonging the disease.

Chronic Cervical Endometritis.—*Pathology.*—In cervical endometritis, which is now usually called uterine catarrh, there is very decided congestion and hypersecretion of the glands of the cervix. This secretion differs very little in its physical properties from that which is normal, except that it is excessive in quantity. If this congestion is long continued, the exfoliation of epithelium progresses faster than its replacement by the development of new cells, so that the membrane is covered with young epithelium which gives it a reddish color.

This disturbance of the balance between the process of exfoliation and reproduction not only involves the mucous membrane of the canal, but extends outward from the os externum about half the thickness of the walls of the cervix. This gives rise to the conditions which were described by the older writers as ulceration of the cervix uteri.

As the process advances the mucous membrane becomes thickened by proliferation of the areolar tissue and by distention of the blood-vessels, so that it becomes too large for the surface which it covers; this throws it into the fine rugosities or wrinkles which give the surface a granular or papillous appearance. These projecting points were supposed by the older pathologists to be an enlargement of the papillæ of the mucous membrane, but it is now known that they are new formations due to areolar hyperplasia. It is supposed, also, that the glands undergo some pathological change other than mere congestion, but probably the only change is a congestion and modification of the epithelium which lines them.

It is claimed by some that new glands are developed upon the outer surface of the cervix around the os externum; I am inclined to think, however, that the glands which are seen outside of the os externum in cervical endometritis appear there because of the thickening of the mucous membrane which causes a procidentia or prolapsus of this membrane.

It is difficult to believe that the inflammatory process could lead to the development of new anatomical structures of a normal character, but there is strong evidence to show that this occurs in the mucous membrane of the cervix uteri. Sometimes the irregularity of surface due to hyperplasia is very marked, especially in cases where there is laceration of the cervix. This condition has been called "granular degeneration"—a good enough name, if it is remembered that it is produced by a throwing up of the membrane into folds or projections by an enlargement and thickening due to hyperplasia, and that it is not a degeneration in fact.

In some cases, especially those that have been treated with caustics, the mouths of the Nabothian glands become closed and the glands become distended by their secretion, and form cyst-like bodies deep in the membrane. These are usually seen at the surface as whitish, pearly-looking points, which contrast with the deep-red color of the mucous membrane around them. To the touch they feel like shot, imbedded in the membrane; these have long been known as the "ovulæ Nabothi"—more recently this condition has been called "cystic degeneration of the cervix" (Fig. 97). Sometimes one or more of them become very large, and by pressure cause absorption of the middle wall of the uterus around them.

The hyperæmia sometimes extends to the middle coat of the cervix, and then for a time the tissues are softened and œdematous.

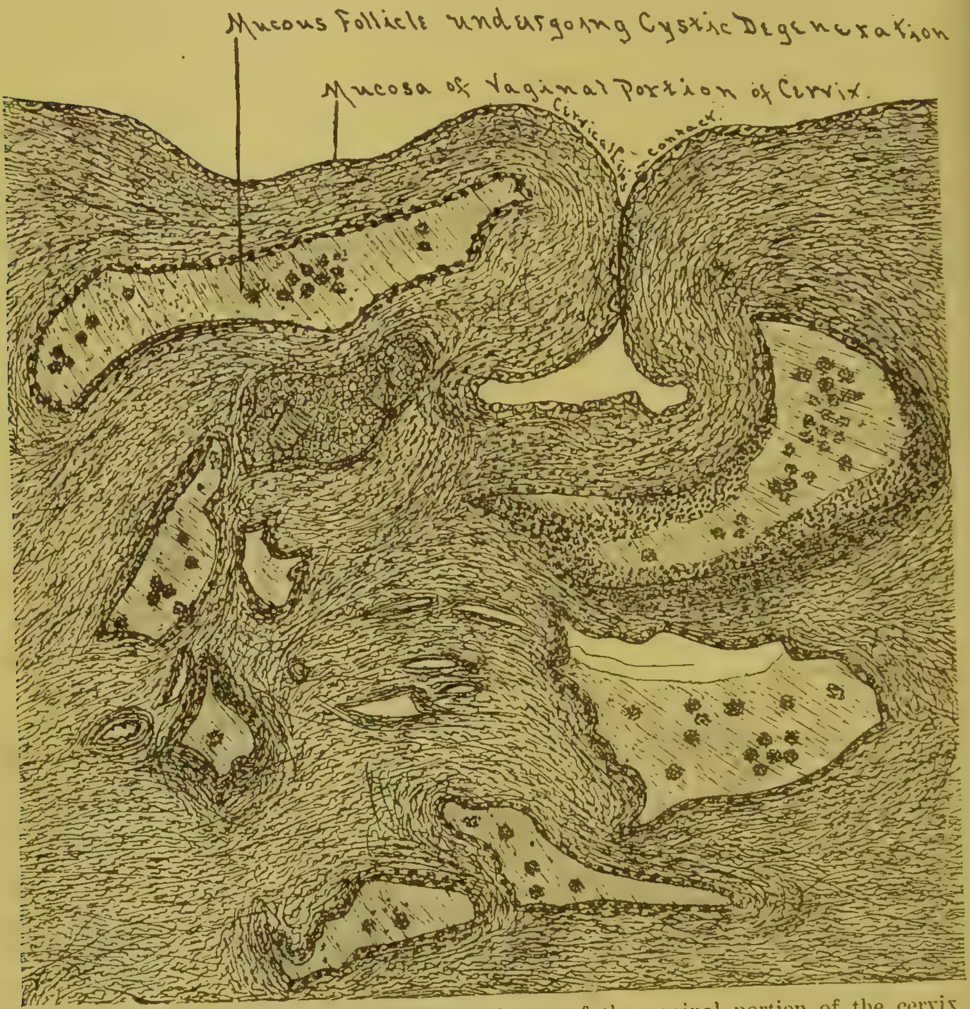

Mucous Follicle undergoing Cystic Degeneration
Mucosa of Vaginal Portion of Cervix.
Cervical lips in contact.

Fig. 97.—Section through the mucous membrane of the vaginal portion of the cervix showing cystic degeneration.

With this condition there is usually free leucorrhœa and menorrhagia, especially when the body of the uterus is affected. Occasionally, though rarely, the menstrual function is suspended or diminished. In some cases of long standing, especially when there is laceration of the cervix, the areolar hyperplasia extends to all the tissues of the cervix, giving rise to that induration known as sclerosis.

These are the principal pathological conditions observed in the ordinary forms of cervical endometritis. Occasionally the discharge may be muco-purulent, at times it is sero-muco-purulent; but this occurs only in extreme cases, and usually is due to some specific cause, and hence need not be considered in this connection.

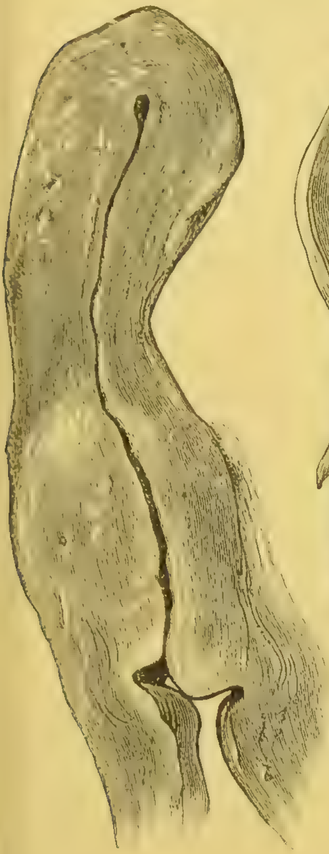


Fig. 98.—Thickening and elongation of the cervix, as a result of cervical endometritis (Winckel).

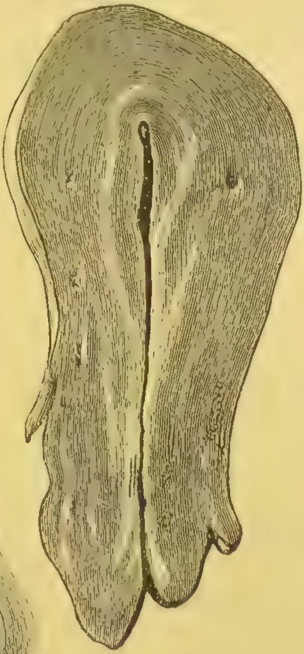


Fig. 99.—Hypertrophy of body of uterus following corporeal endometritis (Winckel).

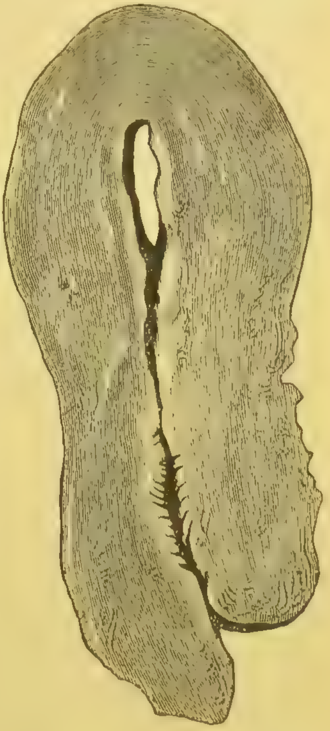


Fig. 100.—General enlargement of uterus, contrasting with the two preceding figures (Winckel).

The ordinary form of cervical endometritis, described above, occurs in parous and imparous alike. There is another form of cervical endometritis which occurs only in the imparous, and has some peculiar characteristics which should be noticed here. In these cases the changes in the vessels already noted may or may not be present; usually they are not. The discharge from the cervical canal is not usually profuse, but it is peculiar in character. In place of the clear, translucent secretion we find a very thick and exceedingly tenacious material of the consistency of thick glue, and of a darkish color not unlike pneumonic sputum, though more solid and dense, and not usually so bright-red in color. Associated with this peculiar discharge there are usually marked tenderness and dysmenorrhœa, which are not accounted for by any other condition of the uterus than the state of the cervical mucous membrane. I am inclined to think that this form of cervical disease is due to some malformation or arrest of development of the glands of the mucous membrane. I have been led to believe this because it occurs in those in whom the uterus is imperfectly developed generally, and also the same peculiar secretion is observed in some women after the menopause, when the uterus and its mucous membrane have undergone final involution.

In other cases of this class the mucous membrane of the cervix becomes prolapsed, causing dilatation and inversion of the lips of the external os, so that the cervix appears as if it had sustained superficial, bilateral laceration. In such cases the appearance is such as to lead to the belief that the patient has borne children, or had a miscarriage; but I have found it associated with unruptured hymen, showing that it could not have come from injuries during parturition.

Dr. Emmet describes cases of laceration that he has seen following criminal abortion in those who have not borne children. In the cases to which I refer the anatomical appearances are the same as he describes, but I am satisfied that in those that have come under my observation the laceration was apparent, not real. As soon as the membrane is reduced to its normal dimensions by exsection of a portion of it, and relief of the inflammation by treatment is accomplished, the external os contracts, and the cervix resumes its original virgin form, showing that no injury to the muscular coats of the uterus has ever occurred.

Symptomatology.—Cervical endometritis does not necessarily give rise to marked constitutional disturbance; when it does so the symptoms usually appear in the form of general debility, especially of the nervous system. The patient may become easily fatigued and somewhat changed in disposition, and less inclined to mental activity. Sometimes there is considerable mental disturbance, but much of all this is usually due to the fact that the patient is annoyed by the presence of a more or less profuse leucorrhœa, which gives her discomfort, and leads her to suppose that she is suffering from a serious affection. The constitutional effects of this local affection depend very much upon the sensitiveness of the patient.

The menstrual function is not necessarily affected. In cases of long standing there may be irregular menstruation, and the flow may be inclined to diminish, but this is not the rule.

The character of the leucorrhœal discharge is diagnostic. It is dense, thick, opaque, and tenacious, while the vaginal leucorrhœa is serous, non-tenacious, and usually purulent. If the disease is long continued backache comes on, the pain being located in the sacral region, which distinguishes it from the lumbar pain characteristic of general debility and some of the acute diseases. There is often, also, some pelvic tenesmus. All these symptoms are usually very much aggravated by muscular exercise; the symptoms alone, however, are not sufficient to enable one to make a diagnosis. All that can be learned from them is simply that there is some uterine affection which, if it does not yield promptly to constitutional treatment, demands further investigation in order to settle definitely its character.

Physical Signs.—These, as obtained by the touch, are usually rather unsatisfactory. Upon making pressure upon the cervix there is sometimes tenderness, but not always; in some cases a roughened condition of the mucous membrane around the os externum can be detected by the touch. Not infrequently there is a little relaxation of the vagina, and the uterus rests lower in the pelvis.

Speculum examination affords the best means of ascertaining the lesions. We can usually see enough of the mucous membrane within the os externum to determine the presence of the inflammation. This is rendered more positive when the redness and erosion of the membrane extend outward upon the vaginal surface of the cervix, and also when there is eversion of the membrane. There is usually a free leucorrhœal discharge from the cervical canal. Sometimes this hypersecretion is the only evidence of the disease present. Passing the sound into the cervical canal shows that it is more sensitive than in health, and the membrane bleeds more easily on touch than it should. It will be seen that the physical signs, as well as the symptoms, are not by any means marked in cervical endometritis, yet they are sufficient for diagnostic purposes. Whenever the constitutional disturbance and the local symptoms are severe, it may at least be suspected that the membrane of the cavity of the body of the uterus is also involved. This will be more fully discussed under the head of corporeal endometritis.

In the form of cervical endometritis referred to, in which the secretion of the glands is opaque, dark in color, and exceedingly tenacious, the discharge is not at all times very profuse, but enough can be obtained by using a small curette to show its character. This in itself will be sufficient to determine the diagnosis.

Causation.—The predisposing causes of endometritis are imperfections in the general organization, and in the development and growth of the sexual organs. Scrofulous and tubercular diatheses incline to chronic inflammation of the mucous membranes generally, and the membrane of the uterus is no exception.

When the uterus is under size or malformed in a slight degree, so that menstruation is imperfectly performed, an inflammation of its mucous membrane is very likely to come on sooner or later. Sedentary habits and unsuitable clothing, over-fatigue in standing or walking, or anything which interrupts the return circulation from the pelvis, predispose to this affection. So, also, deranged nutrition, from insufficient nutriment or over-taxation, mental or physical, which leads to impoverishment of the blood. Frequent child-bearing and prolonged lactation also predispose to the same trouble. All these causes act to produce derangement of innervation and circulation, and so favor the development of inflammation.

The exciting cause which plays the most important part in endometritis is imperfect involution after confinement or menstruation. The great majority of cases take their origin from this imperfection of the menstrual or parturient involution.

Other exciting causes which may be mentioned are injuries to the uterus from displacements, the use of ill-fitting pessaries, injuries during confinement, causing puerperal inflammations; abortion, especially if produced, intemperate coition, and efforts to prevent conception, and finally gonorrhœal virus. This specific cause of endometritis no doubt produces a form of inflammation which differs from the non-specific forms, and hence we will refer to it at another time. So far as I know the same causes produce both cervical and corporeal endometritis, so that in the present state of our knowledge I am not prepared to state any difference in the causes of the two affections, if any such exists. I am inclined to think, however, that as cervical endometritis is beyond doubt much more common than corporeal, it may be inferred that the one tends to the development of the other.

Prognosis.—Of the uncomplicated cases of cervical endometritis the great majority yield to the proper treatment. There is in some a tendency to a recurrence of the disease, even after recovery has apparently been perfect. In those cases of imperfect development there is not the same certainty of giving complete relief.

Treatment.—The constitutional treatment of inflammatory affections of the uterus should be based upon the principles of the general management of local inflammations. To correct any defect in the general health, to improve menstruation, and to calm any excitement of the nervous system, comprehends the whole subject. The sexual organs being dependent upon the nutritive and nervous systems for support, general therapeutic agents can only affect the one by action through the other.

There are a few medicines which act especially upon the sexual organs, through the circulatory or nervous systems, such as ergot, hydrastis canadensis, and the bromides, but their effects are not always efficient in controlling inflammation.

Constitutional remedies, as already stated, act upon the uterus only so far as they improve general nutrition and innervation. In view of these facts, little need be said on this part of the subject; every means which can improve the general health should be employed in connection with the local treatment. To save repetition, the reader is referred to the section on menstrual derangements, third chapter, for details of constitutional derangements which usually accompany diseases of the uterus.

Local Treatment.—Local treatment of the diseases of the uterus—the one organ of the sexual system which is most amenable to local treatment—will be given in the history of cases. Some general remarks, however, on the principal facts in uterine therapeutics may be submitted in this connection. That which is said now will apply in great part to all forms of metritis.

Local treatment should be employed with the view of accomplishing two objects: first, to remove the disease, and, second, to restore the organ to its normal condition.

It will at once be inferred that if the first object is attained, the second will follow as a natural consequence; but it may or may not, according to the character of the treatment employed. I am satisfied that in times past, and even at present, much of the treatment of uterine disease, while it arrests the inflammatory trouble, proves so destructive to the normal structure of the organ as to render the last condition of the patient worse than the first.

In the management of uterine diseases one may be guided by some of the accepted rules laid down by surgeons for the treatment of inflammation generally, viz.: Place the diseased organ at rest; quiet irritation by sedatives, and relieve the congestion by depletion, astringents, alteratives, and sedatives. To accomplish these objects, it is necessary to employ all the improved means brought forward by modern investigation, changing and adapting them so as to meet the peculiarities of each case. First, then, rest should be secured by having the patient abstain from long-continued standing or walking, and from over-excitement of the sexual function. If the uterus is displaced, it should be replaced, and sustained in its normal position by the support of a well-fitting pessary, if need be.

To relieve pain and quiet the irritation a vaginal or rectal suppository made of extract of belladonna, one eighth to one half grain, with cocoa-butter, and used at bed-time, will often give great relief. Suppositories of iodoform and of conium are also of service when used in the same way.

I desire to call attention specially to the next agent, namely, depletion, because I regard it is as a remedy of some value. In making this statement I am aware that I encounter much professional prejudice. Bloodletting has ceased to be the fashion of the day. The lancet is condemned as a "little instrument of mighty mischief." Few of the younger members of the profession have ever seen a patient bled. Local depletion held its own some time after general venesection was to a great extent abandoned, but even this has gradually given way to the popular prejudice of the day; nevertheless, the fact in surgical therapeutics remains as true as ever, that the removal of blood directly from the vessels of an inflamed or congested organ gives some temporary relief.

Frequent repetition of bloodletting should be avoided, but when a case is first seen in which there is marked congestion, the abstraction of a little blood by a few punctures around the os externum, or the superficial scarification of the mucous membrane in this region will pave the way for other applications.

To practice depletion exclusively and persistently, as some of the older gynecologists did, is certainly injurious; but, as a means to be employed in suitable cases, it is worthy of consideration.

Hot water, used as a vaginal douche, is an antiphlogistic which was first popularized in this country by T. A. Emmet. It depletes the parts by stimulating the circulation, and is at the same time something of a local sedative. It is an exceedingly popular remedy at the present time, and is used rather indiscriminately in all diseases of the pelvic organs, and with heroic persistency. If properly used it gives relief in congestion of the vagina and uterus, and in cellulitis when the inflammation is limited to the cellular tissue about the cervix uteri. It is also of service in the passive congestion which often accompanies imperfect involution, but in pelvic peritonitis, salpingitis, and ovaritis it is often harmful.

It is also very liable to do harm when used, as it often is, after plastic operations about the cervix uteri and perinæum.

Another means of depletion was introduced by J. Marion-Sims. He employed a small vaginal tampon of cotton saturated with glycerin, which caused free exosmosis from the mucous membrane, thereby relieving capillary engorgement and œdema.

Position has much influence in modifying the circulation in the pelvis, and hence patients should avoid the too common habit of sitting all day in a chair because they suffer when they walk. Short periods of walking or riding, followed by rest in the recumbent position, should be directed.

In the treatment of endometritis with the applications of curative agents, two very important questions arise: First, what agents shall be used, and how shall they be applied. Bearing in mind that the uterus should not be injured in its structure, the therapeutist is bound to reject all the more powerful and destructive agents, such as nitric or chromic acid, caustic potash, and the actual cautery. All these have been used, and are now, though less extensively, I trust, than formerly, in the treatment of simple chronic endometritis, or hyperæmia of the mucous membrane of the cavity of the uterus.

Leaving out of account the value of these potent agents in the treatment of malignant diseases of the uterus, I desire to be distinctly understood as opposed to their use in the treatment of the benign uterine diseases.

I readily admit that inflammation of a mucous membrane can and may have been "cured," as the expression is, by such means.

The oculist could "cure" a chronic conjunctivitis by destroying the membrane with strong caustic, but I fear the eye would be hardly presentable afterward, and it would surely fail to perform its function. There are those who treat the same affections of the mucous membrane of the uterus with these destructive agents, and the results which follow can be easily imagined. It may be argued, I am aware, that strong caustics are being used less and less by the profession in the treatment of uterine disease, and I am glad to believe that such is the case. Nitric and chromic acids, and other caustics, are being laid aside, but only, I fear, to give place in some cases to new but none the less destructive agents. I allude to the galvano-cautery and the thermo-cautery. These have become the "fashionable" caustics or cauteries of the day, and I trust I most thoroughly appreciate their value in the treatment of malignant disease, when the destruction of tissue is called for; but, in the treatment of inflammation, they can not fail to work great and uncalled-for destruction, like the agents used in the past.

The treatment of the cervical canal is fortunately simpler, being more easy to reach, and much more tolerant of irritation. The only difficulty in the way of making applications is the presence of a tenacious secretion which fills the canal. This should be removed with a small curette before the application is made.

The method of applying these agents is by using the pipette (Fig. 101). Regarding the agents to be used, a long list might be given, but it will suffice to say that the safest and most efficient are mild solutions, one or two grains to the ounce, of sulphate of zinc, chloride of zinc, nitrate of silver, tannic acid, and bichloride of mercury; my own preference for general use is tincture of iodine two parts and carbolic acid one part.

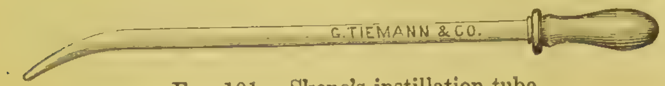


FIG. 101.—Skene's instillation tube.

The frequency with which these local applications should be made depends upon the nature of the lesions. In ordinary cervical and corporeal endometritis, once every five or six days will answer. This gives time for the tissues to fully profit by the application before it is repeated.

I am aware that the practice with some is to make local applications every day or every other day, but I know that this constant manipulation is irritating, and does more harm than good.

Mucous Polypi of the Cervix Uteri.—In connection with erosion of the cervix the glands of the cervical canal sometimes become cystic, and project from the eroded surface. The amount of this projection is occasionally so great that the cysts escape from the canal and hang by pedicles in the vagina. They are not unlike nasal polypi, and are called mucous polypi of the cervix. They are red in color and are semi-transparent.

ILLUSTRATIVE CASES.

A Typical Case of Uncomplicated Cervical Endometritis.—A lady, thirty-two years of age, was married at the age of twenty-one, had borne six children, and had nursed all of them. Her health had always been very good, and her menstruation regular and natural, showing that her general health and organization were excellent. She nursed her last child for eighteen months, her menses returning when her child was ten months old. From that time she had a slight leucorrhœal discharge, which gave her no trouble and was not regarded. Before weaning her child she became quite debilitated, complaining of occasional dizziness, shortness of breath in active exercise, considerable backache, constipation, and occasionally impaired appetite. Her leucorrhœa about this time increased in amount and alarmed her, because she attributed her general ill-feelings to this discharge. This was her condition when she first applied for advice. On digital examination the uterus was found to be normal in size and position, the external os was larger than normal, and there appeared to be slight roughening of the membrane immediately around the os. A speculum examination revealed an areola of a deep-red color around the os externum, and a profuse leucorrhœal discharge from the cervical canal. The cervix appeared to be a little larger than normal, but this increase in size was wholly due to enlargement of the cervical mucous membrane, which was decidedly congested, and possibly somewhat thickened. The internal os appeared to be normal; the mucous membrane of the cervix bled when touched rather gently with the uterine sound. From the fact that her menstrual flow was quite regular and normal, and that the internal os was not unduly dilated, nor the body of the uterus enlarged or tender, the diagnosis of endometritis limited to the cervix was made with positiveness. Her general debility was no doubt due to frequent child-bearing and lactation, and not wholly to her uterine disease, as she had supposed; in fact, I believe that the cause of the endometritis was largely, perhaps entirely, due to her exhausted and debilitated condition.

She was directed to wean her child as promptly as possible, and to rest from all her taxing household duties; to spend some time every day in the open air, riding mostly, and to take an abundance of good nourishing food. The following prescriptions were given to her: A teaspoonful of comp. liquorice-powder at bed-time, to be repeated every night, the quantity to be increased or diminished in order to keep the bowels regular. Two grains of the pyrophosphate of iron were given after meals, well diluted, and a glass of claret. Locally, she was directed to use a vaginal douche of borax and warm water twice a day. This was continued for about two weeks, when it was found that she did not apparently derive very much benefit from it, and she was directed to use it only once a day, which seemed to answer quite as well, and relieved her from the trouble of using it twice a day, which she complained of as a considerable annoyance. Locally, the treatment consisted of a careful removal of all secretions from the cervical canal with a dull curette. In doing this considerable hæmorrhage was produced at first, and it was necessary to wait until this had subsided before making any local application, but as this only occurred a few times it was soon possible to remove the secretions without difficulty, and a preparation of equal parts of tincture of iodine and carbolic acid was applied thoroughly to the entire canal with the glass pipette (Fig. 96). A few drops of this mixture was drawn up into the tube by compressing and releasing the bulb. The pipette was carried up to the internal os, and while it was being slowly withdrawn pressure was made upon the rubber bulb, which gently expelled this mixture and thoroughly applied it to the entire mucous membrane. This local treatment was repeated every five days during the next two succeeding inter-menstrual periods, and the general tonic and sustaining treatment continued, varying the chalybeate tonics from time to time. From this time onward local applications were made after each menstrual period, and again in about two weeks, making two local treatments between each menstrual period. Her general condition greatly improved; the cervix diminished in size by a marked contraction of the caliber of the canal; the leucorrhœal discharge almost entirely disappeared, and at the end of five months from the time that the treatment was first begun she was dismissed quite well. She was directed, however, to return after the menstrual period for two or three months, to ascertain if there was any disposition to a recurrence of the cervical endometritis. It was found that she remained well, and hence recovery was considered to be complete.

Cervical Endometritis, with Hyperplasia of the Mucous Membrane.—This patient was twenty-eight years of age, rather small and delicate-looking, but had enjoyed good health up to her last confinement. She had been married eight years and had three children, the last one being ten months old at the time when I saw her first; she had nursed all her children, the first two for about a year, but the last one she weaned when it was eight months old, because she did not feel well, and had not sufficient milk for it. When her baby was about four months old she began to suffer from leucorrhœa, backache, and pelvic tenesmus—the latter symptoms being very much aggravated by active exercise. She had also lost considerable flesh, was easily fatigued, and somewhat nervous and depressed; her general nutrition appeared to be fair, and her appetite was good; her bowels were regular, and, although her pulse was not strong, she had a good, clear, healthy complexion. Digital examination revealed slight relaxation of the vagina, especially of the upper portion; the uterus was rather low in the pelvis, and, while the body was normal in size, the cervix was considerably enlarged.

The cervical canal was dilated, and the lips of the external os everted. Around the os, and extending outward to about half the thickness of the cervical walls, the mucous membrane was quite granular and rough to the touch. Through the speculum a very free leucorrhœal discharge from the cervix was observed, and the first impression was that there was superficial bilateral laceration of the cervix, but on more careful investigation it was found that the muscular wall of the uterus was very little, if at all, injured, and that the enlargement of the os externum and the eversion of its lips were due to the enlargement of the mucous membrane.

The corrugations of the thickened mucous membrane were so marked as to give a papillomatous appearance, and the congestion was such that the parts bled freely on being touched with a sponge. The patient was put upon a systematic course of rest and exercise, simple but nourishing food, and the citrate of iron and quinine as a tonic. Locally, she was ordered a vaginal douche of two quarts of water, two drachms of borax, and a half drachm of tannic acid to be used twice daily. A number of the more prominent points of the mucous membrane, which projected from the os externum, were removed with the scissors. A borated tampon was introduced and removed on the following day, and two days afterward the iodine and carbolic acid mixture was applied to the whole length of the cervical canal with the pipette. One week afterward that portion of the cervical mucous membrane which could be seen was smooth, less redundant and less vascular; the canal was still dilated, and the rugosities of the mucous membrane were abnormally prominent. The more prominent portions of the mucous membrane of the canal were touched with a fifty-per-cent solution of chloride of zinc applied with a camel's-hair brush. Considerable pain followed this application, and continued until late in the evening. From this onward the vaginal douche was employed once a day, borax and water only being used, the tannic acid being omitted. The carbolic acid and iodine were applied to the canal of the cervix with the pipette, the secretion being carefully removed with the curette before the application. This local treatment was employed once a week during the inter-menstrual periods for about five months, after that one application after each menstrual period for three months longer. At this time her general health had been considerably restored, the canal of the cervix had returned to its normal size, the leucorrhœal discharge had entirely disappeared, and the mucous membrane around the os externum was perfectly normal. She had no further trouble from backache or pelvic tenesmus, and she was dismissed perfectly well, locally and generally.

Cervical Endometritis, Stenosis of the External Os, and Cystic Degeneration of the Mucous Membrane.—This patient was an English lady, thirty-nine years of age. She had two children, the youngest one being five years old. She had an excellent constitution, and her health had always been quite perfect. After her second confinement her convalescence was interrupted for a short time by some local trouble, the nature of which I could not exactly determine. She recovered from this, but afterward suffered from uterine leucorrhœa. This gave her very little trouble, and as she hoped that it might disappear she did not seek medical advice until two years afterward, when she called upon a physician, who told her that "she had ulceration of the womb." He treated her for about six months by applying nitrate of silver, making the applications with a swab through a cylindrical speculum. This I learned from the patient herself, who stated that the doctor told her he was using nitrate of silver.

The treatment diminished the leucorrhœal discharge, but she began to have backache and pelvic tenesmus, with an occasional sharp pain in the region of the uterus. She also had slight dyspareunia. She was told by her physician that the ulceration was cured, and that her symptoms would all probably pass away, but after waiting for six months and finding that they did not she came under my observation. Her general health was still fairly good, but the local symptoms caused her considerable nervous disturbance, and the leucorrhœa had returned, but not so profusely as before. The touch revealed an enlargement of the cervix uteri, and around the os there was a number of quite hard points, some of them projecting a little above the general surface, giving an impression that there was a number of shot imbedded in the cervix. The os externum could not be very clearly made out by the touch. The entire cervix appeared to be a little denser than normal, and on speculum examination the mucous membrane seemed to be red in spots, while the cysts had a whitish or pearly appearance, some of them showing a deep-yellow color. The os externum was somewhat puckered from scar tissue, one well-marked scar running from the posterior lip of the os outward and backward. This was lighter in color than the general mucous membrane. The os admitted a small uterine probe. The canal of the cervix, above the contracted os externum, was found to be considerably dilated, and contained quite a large accumulation of a thick, tenacious, leucorrhœal secretion. The cervix was tender to the touch, but not extremely so; the body of the uterus appeared to be normal in every way.

The conditions here found illustrate a very common class of cases in which there has been ordinary cervical catarrh, which has been treated by the application of a caustic to the vaginal surface of the cervix and the lips of the os externum.

The frequent and long-continued use of nitrate of silver almost always produces stricture, scar tissue, occlusion of the Nabothian glands, and the formation of cysts. The treatment in this case was to first take out a triangular piece of the scar tissue from each side of the os externum, which enlarged it sufficiently. The cysts were then all carefully torn open, and the contents evacuated by pressure; the secretion in the cervical canal was removed with the curette, and an application of the tincture of iodine was made to the canal and the vaginal portion of the cervix. A hot-water douche was directed to be used twice a day. The patient was examined three days after, when the os externum was observed to be contracting somewhat as the healing process was going on. A small tampon of cotton was introduced into the os externum, and maintained there for twenty-four hours by means of the vaginal tampon. It was then reintroduced without the vaginal tampon, and again removed at the end of the next twenty-four hours. This tampon, while it prevented the contraction of the os, interfered at the same time with the process of healing, so it was given up. At the end of a week after the first treatment there was found still a number of cysts, some of them within the cervical canal. These were all opened and the leucorrhœal secretion removed from the canal with the curette, and the mixture of iodine and carbolic acid applied; and tincture of iodine alone applied to the vaginal portion of the cervix.

These applications were repeated once a week, and the warm-water douche continued for four months. During this time all the local symptoms disappeared except the leucorrhœal discharge, and this diminished in quantity and became less opaque in character, but it did not wholly disappear.

The size of the external os remained ample, while the canal contracted very decidedly, so that it was almost of its normal caliber. The scar tissue became less dense, and all tenderness disappeared. After the first four months' treatment the patient was seen for another three months, just after the menstrual period, when the iodine and carbolic acid were applied to the cervical canal, and the iodine to the vaginal portion of the cervix. Seven months from the time that she first came under my observation she was found to be pregnant, and hence was dismissed as recovered. I subsequently learned that she passed safely through her confinement, but I have had no opportunity of examining her since, although I believe that she remains quite well, and hence it can be inferred that the cure was permanent.

Cervical Endometritis treated by Caustic, which produced Contraction of the lower two thirds of the Cervical Canal.—This lady was twenty-eight years of age, of remarkably strong organization, and had always enjoyed good health until the birth of her third child. At that time she had some difficulty in her labor, and sustained a slight laceration of the perinæum; after this she had pelvic tenesmus and leucorrhœa. When she first came under my observation she had slight prolapsus of the uterus, with retroversion in the first degree; there was cervical endometritis, indicated by the deep-red color of the mucous membrane and free leucorrhœa, but there was no other pathological change in the mucous membrane. An application of tannin and glycerin was made to the cervical canal, the uterus was replaced, and she was told that it would be necessary to restore the perinæum in order to give complete relief. The thought of an operation somewhat disturbed her mind, and a friend advised her to place herself under the care of her physician, a homœopathist. This she did, and at the second visit he told her that he had introduced a pencil of nitrate of silver into the womb, and had applied some cotton to keep it there, and desired her to return to his office the next day so that he might remove the cotton. On the way home she suffered severe pain, and was obliged to go to bed as soon as she reached the house. She suffered considerably during the night, and the following day sent for the physician, who removed the cotton, and told her that she would be all right. She continued, however, to have a good deal of pain and pelvic tenesmus, especially when she tried to stand or walk. For the next two or three days she had a discharge which differed from the former leucorrhœa; it was less tenacious, yellow in color, and at times quite offensive in odor. She returned to the physician for further treatment as soon as she was able. The discharge became very much less, and finally disappeared entirely. She was encouraged to hope that she would get well without any further treatment. In this, however, she was misled. Her backache and pelvic tenesmus increased in severity, especially when standing or walking, and she began to have painful menstruation. About a year from the time she had the caustic applied she returned to me. I found the displacement about the same; there was no leucorrhœal discharge whatever, and no external evidence of the former endometritis. The os externum was contracted, and its lips curved inward; the tissues around the os were extremely hard, and to the touch and inspection appeared to be mostly scar tissue.

The cervical canal was contracted in its lower two thirds, so that a small uterine sound could be passed with difficulty; there was none of the elasticity of the normal canal left, but a hard, almost cartilaginous condition existed. The passing of the sound caused considerable pain, and some hæmorrhage. The patient was then sent to my private hospital, and an effort was made to dilate the cervix by the use of graduated sounds. This gave pain, and was not effectual. Then the whole length of the contracted portion of the cervical canal was incised on the two sides, the incisions being made with my hysterotome (Fig. 42) through the scar tissue, and the canal was then dilated sufficiently to admit a No. 23 sound; a tent made of marine lint and dipped in carbolic acid and glycerin, one part of the former to three of the latter, was passed up into the canal and retained there by a vaginal tampon; this was left in position for twenty-four hours, when it was removed. A short, hard-rubber stem-pessary, which reached beyond the line of contraction, but not up to the internal os, was introduced and worn for nearly three weeks. During that time it was repeatedly removed and tincture of iodine applied to the cervical canal, and a vaginal douche of borax and warm water was used. The treatment was continued throughout with all antiseptic precautions. After the operation on the cervix the uterus was kept in place, first by means of a tampon, and subsequently by means of the pessary, which answered the purpose while the patient remained in a recumbent position. The perinæum was then restored, and the patient dismissed after two months of treatment in the institution. She subsequently returned to me once a month, when I passed the uterine sound and applied the tincture of iodine, in order to prevent any recurrence of the contraction. Six months from the time that she was operated upon she became pregnant, and, although some trouble was anticipated in the dilatation of the cervix during her labor, there was none. Prof. Charles Jewett attended her in her confinement, and all went well, and she has remained free from uterine trouble ever since.

Cervical Endometritis in an Imparous Woman.—This was a cultivated lady, with an excellent constitution, who began to menstruate at fourteen, while she was a school-girl, and continued to do so normally until she had been teaching several years in a high school. She taught many hours daily, and being strong and very energetic she preferred to stand, as a rule, while drilling her class. This overtaxation brought on dysmenorrhœa, backache, and leucorrhœa. These symptoms were not marked at first, but as she kept on at her work they gradually increased. When she was twenty-eight years of age she came under my care. She had then been married about one year, and although her symptoms had not increased—in fact, she had enjoyed better health after being relieved from her arduous duties as a teacher—still she had backache and leucorrhœa, especially on taking active exercise; and she was sterile. I found the menstrual function perfectly normal, except that she had backache and some pelvic tenesmus during the flow, but these were relieved to some extent if she kept quiet. Her chief symptom at that time was a rather free leucorrhœa. A digital examination found the pelvic organs well developed. There was no tenderness nor any evidence of disease that could be obtained by the touch, except that the os externum appeared to be larger than is usually found in the virgin cervix. On speculum examination quite a free leucorrhœal discharge was observed, and there was a ring of deep-red color in the mucous membrane around the os externum. The cervix was rather large in proportion to the body of the uterus, and was of a deeper color than normal, and the upper portion of the vagina also was congested. The canal of the cervix, including the internal os, was normal in size, so that the uterine sound could be passed to the fundus without difficulty or causing much pain. As her health was quite good, no constitutional treatment was necessary. During the succeeding two months six applications of iodine and carbolic acid were made to the cervical canal. The next month three applications were made of iodine alone, and the next month after that glycerin and tannic acid were applied. At the end of that time the leucorrhœal discharge had entirely subsided, the patient suffered much less from backache, and had no pain or discomfort at her menstrual periods. She was then dismissed, and nothing more was heard of her until four years afterward, when she returned to inform me that she was two months pregnant. I have not seen her since, but have heard through her family that she was delivered of a healthy child after a somewhat tedious labor.

Cervical Endometritis in an Imperfectly Developed Uterus.—This lady appeared to be rather frail, but had always enjoyed good health. She began to menstruate first at thirteen, and for the first year was rather irregular, and always had some pain the first day. The flow lasted only from two to three days, and the dysmenorrhœa increased somewhat from month to month; and she began to have backache before and after menstruation, with occasional leucorrhœa. When she was twenty-four years old she was married, but from that time onward her dysmenorrhœa increased; she had almost continuous backache, and a good deal of tenesmus, with occasional attacks of frequent urination. One year after her marriage she came under my observation, and I found the uterus rather below the normal size; there was slight anteflexion of the cervix, but the body of the uterus was in its normal position. The uterus was tender to the touch, and there was also some hyperæsthesia of the vagina. A speculum examination revealed a general congestion of the cervix and vagina, the cervix being smaller than it ought to be; the os externum was small, and while there was a slight vaginal leucorrhœa there was no discharge from the cervix. The canal of the cervix was quite large in proportion to the size of the external os, and the os internum was so small that an ordinary-sized uterine sound was passed with difficulty, and caused pain. The canal of the cervix contained a plug of very thick, dark-colored, and very tenacious secretion. This was removed with the curette, but with great difficulty, and quite a free hæmorrhage occurred during its removal. After removing this secretion very carefully, and waiting until all hæmorrhage had subsided, a mixture of carbolic acid, glycerin, and water was carefully applied to the entire canal for the purpose of neutralizing any septic material which might exist there. A small V-shaped piece was removed from each side of the cervix at the os externum, and four very superficial incisions were made at the os internum. The uterine dilator was then introduced, and the os internum and externum dilated until a No. 9 sound could be easily introduced. The patient was kept quiet in bed for several days, and as there was no constitutional or local disturbance at the end of that time she was allowed to get up and go about again. From this time onward for about three months the uterine sound was passed once a week to prevent contraction of the cervical canal. At the same time the secretion was carefully removed from the canal, and carbolic acid and tincture of iodine—one part of the former to two of the latter—were thoroughly applied. A vaginal injection was ordered of one quart of warm water and forty grains of sulphate of zinc, to be used once a day. The effect of this treatment was to relieve the dysmenorrhœa, backache, and general feeling of discomfort in the pelvis.

The leucorrhœal discharge became more free, somewhat lighter in color, and less tenacious. The application of iodine and carbolic acid was continued for two months longer, when all treatment was suspended for three months. At the end of that time she returned, and stated that her leucorrhœa remained the same, although otherwise she felt tolerably well. In passing the sound the canal of the cervix was found to be ample, but the character of the secretion had returned to what it was when she first came under my observation. I made applications of the tincture of iodine to the cervical canal for about two months, without apparently improving the condition; I then tried a 10-per-cent solution of chloride of zinc, applying it once a week, but without improving the case. I then decided to remove a longitudinal strip from each side of the mucous membrane of the cervical canal; this was accomplished by seizing the cervix with a tenaculum, and then passing a small-sized Sims's curette (Fig. 102) up to the internal os, and under strong pressure drawing it down and cutting out a deep strip of the mucous membrane.

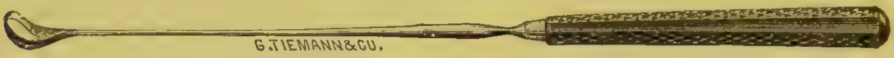


FIG. 102.—Sims's curette.

This was repeated on the opposite side. The idea of removing the two sections rather than removing the entire membrane, as recommended by Sims, Thomas, and others, was to leave a portion of the membrane, which would expand as healing took place, and in that way compensate for the loss of tissue, and thereby prevent the occurrence of stricture of the canal by contraction. During the healing process the uterine sound was cautiously passed about every third day. This at first caused some hæmorrhage and pain, but soon it could be done without trouble of either kind resulting from it. The applications of iodine were again begun and continued for about two months, six applications in all being made. The final effect of this was to control the leucorrhœa, and the little discharge that remained became more transparent and less tenacious—more like the normal secretion of the Nabothian glands. She was then dismissed apparently well, and she remained so, but continued to be sterile.

I have treated a large number of cases of this class in the same way, except that I have not lost time in trying different applications, but have removed the sections of the mucous membrane at the outset. Two of my patients have subsequently borne children; several of them have had some contraction of the canal, which had to be relieved by dilatation. In quite a number of them the leucorrhœa has returned, and while I have been able to keep them comfortable by occasional treatment, they have never completely recovered.

Cervical Endometritis in a Young Girl, with Marked Thickening of the Mucous Membrane of the Cervix, Dilatation of the External Os, and Eversion of the Mucous Membrane.—This girl was rather small, delicate, of marked nervous temperament, and highly cultivated. Her circumstances were such that she had been able to obtain an excellent education and every advantage and accomplishment that she could desire. She was precocious, and began to menstruate when she was eleven and a half years old. She had always suffered slight pain during her menses, and also had leucorrhœa, which was trivial at first. She had suffered much from backache, headache, and general debility, but was able to attend to her education until she was sixteen years old. Her leucorrhœa at that time became quite profuse, and her backache and pelvic tenesmus so severe that she was obliged to give up muscular exercise almost altogether. During this time she had been treated with tonics, and change of air. At the age of eighteen she was placed under the care of a physician in New York, who said that she had some falling of the womb, and treated her by tamponing the vagina with cotton, after the method of Boseman, who, I believe, calls this method of treatment "columning the vagina."

She derived no benefit from this, although it was continued for several months. In fact, she became much worse. She was then placed under my care, when she was nineteen years of age; her general condition at that time was one of marked neurasthenia. Her extremities were cold and clammy, her pulse was feeble and rapid; her pupils were widely dilated, and, while she was naturally of a pleasant and happy disposition, she became apprehensive of trouble, and spent most of her time in thinking and talking about her symptoms. Some times she was dull and sleepy, at other times wakeful and sleepless; her appetite was capricious—at times good, and at other times poor; her bowels were constipated; she was quite emotional, and easily affected to tears by either pleasant or unpleasant mental impressions.

The uterus was found in its normal position, its body normal in size and shape, and not especially tender; the ovaries were tender; the cervix was quite enlarged, and to the touch gave the usual physical signs of a cervix that has sustained a bilateral laceration superficially, or sufficient to give rise to ectropion, as it is now called.

The vagina and vulva were quite relaxed, due, I presume, to the long-continued use of the tampon; at least, I know of no other reason for this condition, although she was evidently of an amorous disposition, and no doubt suffered from physiological congestion of the sexual organs. I have no reason to believe that she had ever abused herself or been abused, unless this tamponing treatment under the circumstances may be called abuse.

The speculum revealed a large cervix, looking quite like that of a woman who had borne children. There was well-marked eversion which brought into view anteriorly and posteriorly about half an inch of the cervical mucous membrane, which was easily recognized as such by its rugous arrangement, and the presence of the Nabothian glands, which, though they could not be seen, were proved to be present at that point by the secretion which was freely poured out on the exposed surface.

The most careful examination failed to find any injury of the muscular walls of the cervix showing that the case was one of eversion of the cervical mucous membrane. This patient entered my private institution, and was treated generally by rest, massage, baths, and careful attention on the part of the nurse, with a view to improving her mental condition by diverting her mind from herself, and fully occupying her time with the treatment. The bowels were kept regular with a laxative pill; sleep was secured by a dose of bromide in the afternoon, and another at bed-time when necessary; and one ninetieth of a grain of the hydrobromide of hyoscine was given three times a day, with the effect of improving her nervous system. A vaginal douche was given once a day, consisting of sixty grains of sulphate of zinc to a quart of warm water. This had the effect of overcoming the vaginal relaxation after a time. Three weeks after she came under my care her general health had improved noticeably, and she passed through her menstrual period with less pain. I then removed the everted portion of the mucous membrane, being careful not to make the exsection entirely circumscribe the os externum. On the sides, where the eversion was less marked, portions of the membrane were left untouched. This was done to avoid stricture, which I presumed might occur after healing. The exsection was made with the scissors, and though there was considerable hæmorrhage, this was controlled by the application of pledgets of cotton dipped in chloride of iron, and kept in place by tamponing. When the tampon was removed the douche of zinc solution was resumed, and once a week thereafter iodine and carbolic acid were applied to the cervical canal. As the healing progressed the external os contracted, and the caliber of the canal diminished; the leucorrhœal discharge also subsided, and at the end of three months the local trouble had entirely disappeared, and the cervix looked like a virgin cervix, except that the os was somewhat larger and oblong instead of circular. Her general health greatly improved, and she was soon able to take gymnastic exercise and cold baths, and to walk and ride in the open air.

She was dismissed quite well, and has remained so.

CHAPTER X.

CORPOREAL ENDOMETRITIS.

The most conflicting views are to be found in the literature of medicine regarding the relative frequency of corporeal and cervical endometritis. Much of this division of opinion comes, no doubt, from imperfect knowledge regarding the diagnosis of corporeal endometritis.

The facts appear to be as follows: That corporeal endometritis is not so often seen as cervical; that either may occur alone; that they may occur together; and that corporeal endometritis alone is most rare of all. These facts have been obtained from long-continued observation in a very large field, and I feel confident of accuracy in the facts, because I have given due attention to the means and methods of diagnosis—the only way to arrive at correct conclusions.

There is another cause of confusion on this subject growing out of imperfect methods of investigation, and that is, classing under the head of endometritis some widely-differing pathological conditions, such, for example, as the changes in the tissues following the acute puerperal affections of the uterus.

It will be seen by what follows that, although the diagnosis of endometritis is difficult, careful attention to that part of the subject will secure a degree of accuracy which has not been heretofore generally attained.

Pathology.—The pathology of corporeal endometritis is doubtless the same in character as that of cervical endometritis, but unfortunately there are not the same opportunities of observing the changes which take place in the mucous membrane as in the cervical form. On this account post-mortem examinations are the chief sources of knowledge of the pathology, and as this disease is never fatal an opportunity of examining the uterus only occurs when patients with endometritis die of some other affection, hence the inexact knowledge on this subject.

There is also a marked liability to error in post-mortem investigations of the endometrium. In constitutional diseases, which prove fatal, there are certain changes in the mucous membrane of the uterus which resemble those of endometritis, yet they are not exactly the same, and do not represent the anatomical lesions of uncomplicated endometritis, and should not be taken for such.

The facts regarding the pathology of corporeal endometritis which appear quite definitely settled are as follows: In some cases there is a general congestion and thickening of the entire membrane, the lesions of vascularity extending to the glands of the uterus. This gives rise to increased nutritive activity on the part of these glands, and hypersecretion. I am not at all satisfied, however, that the discharge from these glands is exactly the same as it is from the cervix. I am inclined to think that it is more serous, less tenacious, and more frequently contains blood than that from the cervical glands. The whole mucous membrane may be denuded of its epithelium, or it may be so only in parts; and, again, the congestion appears to be greater in spots, and in these places there is thickening of the membrane. These thickened red patches are generally found at the mouths of the glands. Not infrequently there are proliferations of the mucous membranes, polypoid in character—a condition which is sometimes called "endometritis polyposa." This new product is one of the most common results of endometritis of long standing.

Sometimes the walls of the uterus are found thickened so that the whole uterus, as well as its cavity, is enlarged. In other cases the walls of the uterus have been found diminished in thickness, and changed in structure by fatty degeneration. These changes in the walls of the uterus may or may not be due to the endometritis.

Corporeal endometritis belongs to that class of inflammations in which the process does not pass through its various stages, and then end in recovery, with or without permanent changes of structure. In this it differs from acute inflammations, which begin and run through all their stages, and end in recovery.

If once well established, the inflammation shows very little tendency to recover without treatment; hence it is that the cases are often found that begin in early life, and continue up to the menopause. There is very little tendency in the natural history of these affections to become worse or change their character; they often remain the same, excepting that the constitutional disturbance may increase, and the patient fail in general health.

Symptomatology.—Owing to the fact that the diagnosis of corporeal endometritis is difficult, it is very necessary to give close attention to the evidence presented.

The symptoms of this affection are well marked, and, although not diagnostic, they are of great value when taken in connection with the physical signs. They naturally arrange themselves into two classes—constitutional and local.

The constitutional symptoms are manifested by the nervous system and digestive organs. There is frequently capricious appetite, flatulence, and constipation. The derangement of the stomach is irregular, often varying in a day, showing that it is a reflex nervous disturbance, not unlike that which occurs in gestation. The mammary glands are often sympathetically affected, becoming enlarged and tender, and the areola takes on a darker color. These symptoms, taken in the aggregate, resemble very closely those found in spurious pregnancy, excepting that the mental obliquity is absent. It will be seen that the symptoms, including the derangement of the digestive organs, are all such as might be expected from reflex nervous derangement, and such, no doubt, is their explanation.

I am aware that the symptoms here given have all been said to occur in cervical endometritis, but, while there may be some slight constitutional disturbance from this affection, it is never so well defined as in corporeal endometritis.

Symptoms referable to the general nervous system, which occur in this affection, are not diagnostic, yet they are valuable when taken in connection with the rest of the history.

Headache, sleeplessness, mental depression, and pains in the spinal cord, are often present, but I know of no special nerve symptoms peculiar to corporeal endometritis. Among the local symptoms the most important, by far, is derangement of the menstrual function. This I consider the symptom by which the differential diagnosis between cervical and corporeal endometritis can be made, and therefore it should be borne in mind at all times.

One would naturally expect that in inflammation of the corporeal endometrium the function of the membrane would certainly be deranged, and such is the fact. The catamenial discharge may be profuse, scanty, irregular, and attended with pain, or the function may be suppressed altogether; the rule is, however, that profuse, prolonged, and painful menstruation is present. When either of these menstrual derangements occurs, and there is no constitutional or other local cause to account for it, we may reasonably infer that the mucous membrane of the uterus is at fault.

It may appear strange that opposite conditions, like menorrhagia and amenorrhœa, should occur in the same affection; but this is accounted for by the condition of the mucous membrane in the different stages of the disease. The same peculiarities of behavior are noticed in inflammation of other mucous membranes; for example, in bronchitis the membrane at first may be unduly dry, and at another stage of the disease there may be a profuse secretion. In addition to these changes, in the menstrual function there usually is marked backache, not different in character, but being more severe than in cervical affections. There is also more pain in the uterus, pelvic tenesmus, vesical and rectal irritation. Leucorrhœa is a marked symptom also. The character of the discharge, as already noticed, is more serous, less tenacious, and more frequently contains a few blood- and pus-corpuscles. When cervical and corporeal endometritis occur together, the discharge shows the characteristics of both affections.

Physical Signs.—The physical signs of endometritis are the same in character as those indicative of inflammation elsewhere. There is tenderness detected by the bimanual touch, which usually shows that the body of the organ is sensitive. After thoroughly cleansing the vagina with a douche, a small tampon of cotton should be placed against the cervix and allowed to remain for two or three hours. If pus is found on the cotton, it is a valuable sign of corporeal endometritis. By the use of the sound, four indications of the disease can be obtained. First, the abnormal tenderness; second, the enlargement of the uterine cavity, as detected by actual measurement; third, dilatation of the os externum; and, finally, the great vascularity of the membrane, as shown by bleeding on touch.

In using the sound for diagnostic purposes in corporeal endometritis, much skill and practice are necessary in order to make the examination with advantage to the diagnostician and safety to the patient. Moreover, care should be taken to make a disinfectant application before using the sound, and to be sure that the sound itself is thoroughly aseptic. Many of the difficulties following the use of the sound, related in the books, I believe to be due to lack of care and attention to these points, thus permitting the carrying of septic material into the uterus.

The density of the uterine tissues is a valuable sign in determining the existence of endometritis. As a rule, the body of the uterus is less dense than normal, excepting in cases of long standing, in which there is sometimes induration or hardening of the uterus.

Prognosis.—Corporeal endometritis is more difficult to manage than cervical, and hence this has led many of the writers in the past to state that the affection is incurable in many cases. At the present time I believe that a more favorable view of the matter may be taken. The disease in itself is not dangerous to life, and, when uncomplicated, will usually yield to appropriate treatment. There is a decided tendency in many cases for it to return, but even then it can be relieved by removing the cause. Recovery takes place at the menopause or senile endometritis follows.

The affection is not in itself self-limited, but is limited by the period of functional activity of the uterus. There is a prevailing opinion that endometritis, when it continues up to the menopause, complicates "the change of life," and favors the development of malignant disease. The former opinion is true, the latter doubtful.

The results vary with the different kinds of treatment used. I have never seen a case cured by certain methods, which have been commended to the exclusion of all others; for example, hot-water douching, and the application of the tincture of iodine to the vagina.

Neither does endometritis yield to treatment so long as there is a displacement of the uterus, or a laceration of the cervix; but, when all the conditions necessary to recovery are secured, then endometritis will yield to local treatment in the vast majority of cases.

Causation.—The causes of corporeal endometritis have been referred to in discussing cervical endometritis; hence, to save repetition, it will suffice to say that there are certain conditions of the general system which predispose .to the affection. The strumous diathesis, imperfect general nutrition from either gross living and sedentary habits, or exhaustion from overtaxation, are the chief predisposing conditions.

The direct or exciting causes are complicated labors, miscarriages, derangement of menstruation, and sepsis.

The vast majority of cases of corporeal endometritis, which have come under my observation, were clearly due to the causes given above. In fact, if those caused by gonorrhœa are excluded, nearly all the others can be ascribed to lesions of parturition and derangement of menstruation, which arrest the post-partum and post-menstrual involution.

Treatment.—The constitutional treatment of inflammatory diseases of the uterus was briefly referred to while discussing the treatment of cervical endometritis, so that it is only necessary to repeat the general statement, that every means should be employed to restore the general health. The treatment must, as a matter of course, be adapted to the nature and degree of the impaired state of the general organization in the given case.

The local treatment, such as the hot-water douche, already described, applies in part to cervical endometritis, and therefore need not be repeated here. It will suffice to give directions regarding topical applications to the corporeal mucous membrane.

I will first consider the indications for intra-uterine medication, the remedies to be used, and the means of employing them. This question is still with many an unsettled one, both as regards the curability of corporeal endometritis, and the value and safety of intra-uterine medication. The literature on the subject of intra-uterine treatment is not very definite, hence I shall confine myself to a few points, which I regard as fairly well established, and likely to be of service in the treatment of this disease.

The important questions which come up for consideration on this subject are, first, is it safe and advantageous to make intra-uterine applications? Second, if so, what curative agents shall be employed; and, third, how shall they be applied?

Turning to the text-books or the current literature on the subject in search of an answer to the first question, I find the greatest diversity of opinions.

The pioneer gynecologists of Europe, such as M. Gendrin, M. Jobert de Lamballe, Bennet, and Simpson, rarely, if ever, made applications beyond the os internum, believing that endometritis could be cured by treating the cervix and the cervical canal. On the other hand, we find that Aran, Scanzoni, and Gantillon, and Dr. Henry Miller (who, by the way, was the first to employ intra-uterine medication in this country), Kammerer, Nott, Peaslee, and many others, relied to a very great extent on intra-uterine applications for the relief of corporeal endometritis.

Many more names might be mentioned to show the want of harmony among physicians on this point, but no useful knowledge would be gained thereby. All that can be learned from a review of the literature is that intra-uterine medication is more extensively employed now than formerly. Believing that time tends to drift the profession to the side of correct therapeutics, it may be inferred that local applications to a part or to the whole of the lining membrane of the uterine cavity are sometimes necessary, if not indispensable, in treating endometritis.

In seeking an answer to the second question, one encounters a variety of medicinal agents, ranging from the actual cautery to the blandest anodynes.

Bearing in mind, however, the second object to be gained, namely, to restore the organ to health, and leave it uninjured, it is evident that all destructive agents should be avoided.

This has already been stated in discussing the treatment of cervical endometritis, and all that was then said applies with greater force in regard to corporeal endometritis, because that portion of the mucous membrane is more delicate in structure.

In my own practice I employ either bichloride of mercury, one grain to an ounce of water; tincture of iodine; tincture of iodine, two parts, and carbolic acid, one part; or suppositories of iodoform and cocoa-butter.

There is so much risk in treating the mucous membrane of the cavity of the body of the uterus that there are certain precautions which should be kept in mind. These may be formulated as follows: That intra-uterine applications, excepting to the cervical canal, should not be used until other means have been thoroughly tried and have failed. The uterus should be in or near its normal position. The cervix uteri should be sufficiently dilated to allow any excess of the fluid to escape from the cavity of the body.

After having carefully freed the cervical canal from the secretion, the easiest and most effectual way of making applications is to use the glass pipette, already described.

The solution to be employed is drawn up into the glass tube by the rubber bulb; the instrument is then passed up to the os internum or to the fundus uteri, if desired, and, as it is withdrawn, pressure is to be made upon the bulb which forces out the solution and brings it in contact with the entire lining of the canal.

The method generally in use of dipping a probe wrapped with cotton into the solution, and passing that up into the canal, is very unsatisfactory. The cotton on the probe injures the mucous membrane, and the solution is deposited about the os externum—very little, if any, getting into the canal.

The injections by means of a syringe and a reflux catheter, commended by many, I have tried, but I have abandoned the method because it is dangerous and unnecessary.

It is well to use some bland fluid, such as warm water and salt, to test the toleration of the uterus before using the more potential agents. A small quantity of the agent used is all that is necessary. Six to ten drops is sufficient to cover the surface to be treated, and more than that is useless.

When from long-continued congestion the mucous membrane of the cavity of the uterus has become hypertrophied, giving rise to that condition now known as endometritis polyposa, the use of the curette gives the most prompt relief. The blunt instrument should always be used, because it is perfectly effective and free from danger.

Method of Curetting.—The pathological conditions which demand the use of the curette have already been referred to. The instrument which I employ has also been described, and the advantages which I consider that it possesses have been clearly pointed out. There is still something to be said regarding the method of using it. Dilatation of the cervical canal should be made rapidly, under anæsthesia, with Goodell's dilator. This method of immediate dilatation is greatly in advance of the old way of dilating by sponge or sea-tangle tents, which always caused great pain, and sometimes inflammation and septic infection.

The patient is placed in Sims's position and the cervix caught and held with a tenaculum curved on the flat (see Fig. 6) and the cervix dilated. The curette is then curved so that it will pass into the uterus and to one side, and, while the to-and-fro motion is being made, the instrument is also moved slowly toward the opposite side. I find that, with my curette, fungosities or decidua can be pushed off or detached with the upward as well as with the downward or scraping motion. When the anterior wall has been thoroughly treated, the instrument is withdrawn into the cervix, bent a little in the opposite direction, and turned around so that it will face the posterior wall, which is then treated in the same manner as was the anterior. From a large experience I have come to look upon this operation as one of the safest in gynecology, and very satisfactory in its results. Of course, the usual surgical cleanliness should be observed, and the uterus should be washed out with an antiseptic solution and packed with gauze.

ILLUSTRATIVE CASES.

The patient was thirty-two years of age, who had been married ten years, and had given birth to two children. She made a slow recovery from her last confinement, and nursed her child for about six months. Her health then began to fail, and the child was weaned.

Two months after this the menses returned, and at the time were quite scanty and only lasted for a day or two. After this she suffered from backache, pelvic tenesmus, and irritable bladder, with free leucorrhœa, at first like an ordinary cervical secretion in character. Her general condition also became disordered. The appetite was capricious; the bowels constipated, and distended from flatulence. She also had occasional attacks of nausea, and at times headache; she became quite nervous, and her sleep was broken. Her menstruation became irregular, generally coming on at the end of two or three weeks and continuing longer than normal, and was too free. When first examined I found the uterus large, the increase in size being mostly of the body and fundus. Bimanual pressure being made upon the body of the uterus gave rise to a dull pain. A speculum examination revealed considerable redness around the os externum. The discharge, as seen coming from the canal, was dark in color, as if stained and streaked with blood; around this tenacious material there was a little sero-purulent discharge noticeable. The sound entered two and a half inches, and could be moved about considerably in the cavity of the body, showing that the cavity was enlarged. Gently touching the fundus and sides of the uterus with the sound gave rise to pain, and the patient complained of a little nausea and faintness. From the general history and the physical signs the diagnosis of inflammation, involving the entire mucous membrane of the uterus, was made.

The subsequent history fully corroborated the diagnosis in every respect. At this time the patient's tongue was coated, her appetite poor, and she was constipated. A dose of blue mass with a grain of ipecac was given at night, followed by a Seidlitz powder in the morning; and after this a bitter tonic of colombo and wine of ipecac before meals. A teaspoonful of Parish's compound syrup of phosphates, well diluted, was given after meals.

The constitutional treatment consisted simply of iron tonics, a laxative pill, plenty of nourishing food, and a very little exercise. Once a week I removed the secretion from the cervix, then applied carbolic acid and iodine, and ordered a hot-water douche night and morning. The local application caused pain for several hours, and did not appear to do any good. I passed a medium-sized curette into the uterus, and gently curetted the entire mucous membrane of the body; this brought away considerable serum and blood, some of which, from its dark color, had evidently been retained for a considerable time. There was also muco-purulent material which came away at the same time, but this may have come from the cervix. On carefully examining all that was removed from the uterus, several little masses of fungous material were found, and several shreds that looked like portions of the epithelial layer of a thickened and softened membrane.

The curetting seemed to be a failure, so far as obtaining any large-sized fungosities which I had been led to suspect existed from the frequent and profuse menstruation. Considerable pain was caused by the use of the curette, and it lasted for several hours, but finally passed away. The patient also complained of being faint and having nausea, and, as she appeared pale after the operation, I have no doubt that her suffering was very great, though she was a brave lady, and did not complain without cause. There was considerable oozing of bloody serum from the uterus after the curetting. About five days afterward an examination revealed a copious discharge of cervical secretion, which was rather dark in color and slightly yellow, as if it contained pus. Very small clots of blood were also found entangled in it. The cervix was then freed from the secretion, and iodine and carbolic acid again applied. The next menstrual flow came on at the proper time and was quite free, but it did not last quite as long as usual. Two days after the flow had subsided I again used the curette, with the result of bringing away some blood and muco-serous material, but no shreds of membrane nor fungosities. The patient suffered much less this time from the treatment. From this onward, once a week, a pencil made of cocoa-butter, and as much iodoform as the butter would take up (about four grains in all), was passed up into the cavity of the uterus as near to the fundus as possible; carbolic acid and iodine were applied to the cervical canal. This treatment seeming effectual, it was repeated once a week for about two months; during this time the uterus diminished in size, the discharge also became less, and changed to the character of that usually found in cervical endometritis. The menstruation then became regular as to time and less profuse, and did not last longer than the usual time. The intra-uterine applications were then suspended, except the application of iodine and carbolic acid, which was continued once a week to the cervical canal for about two months longer. She had then improved so much in her general condition, and the uterus appearing to be normal, except that she still had slight cervical leucorrhœa, I unwisely told her that she was quite well, and she did not return for any after-treatment for six months. Her leucorrhœa at this time became again rather troublesome, and she came back for further care. I then found that her general condition was entirely satisfactory; her menstrual flow was regular and normal; the internal os had contracted to its natural size; the uterus measured three inches only in its longest diameter, and all that remained of the former trouble was a hyperæmic state of the cervical mucous membrane, with leucorrhœa; this was treated for about six weeks with one part of carbolic acid to three of iodine, and then she was dismissed perfectly well.

I have been informed that she has given birth to a child since she was under my care.

Chronic Corporeal Endometritis.—The patient was twenty-nine years old, and had one child when twenty-three, and a miscarriage when twenty-five years of age. Up to the time of her miscarriage her health had been very good, but from this time she began to suffer.

The menses, formerly normal, began to be too free, and were attended with pain. In fact, from the time of the miscarriage she had menorrhagia and dysmenorrhœa, and both became more marked as time went on. The pain in the uterus at the time of the menses was not acute, but was continuous and aching. It began a day or two before the flow and continued until the flow ceased, and sometimes for several days after. There was some irregularity about the recurrence and quantity of the menses, and she observed that when the flow was very free the pain was not so severe. At some of the menstrual periods the flow would begin and go on for a day and then stop for hours, and then come on again quite freely. When these interruptions took place there usually were clots passed, which evidently came from the uterus, because they were expelled after pains which differed from the usual pain in being more acute and intermittent.

The menorrhagia and dysmenorrhœa became gradually worse, the pain being greater when the flow was less. She became much exhausted at each period, either from pain, loss of blood, or both. Throughout the whole course of the affection she had a discharge from the uterus which was sero-purulent.

At times, especially before the menstrual period, there was a cervical leucorrhœa, but the discharge from the body of the uterus was most marked and continuous. It was more yellowish in color, less tenacious than cervical leucorrhœa usually is, and oftentimes it was tinged with blood and quite offensive in odor.

There was much backache, pain in the pelvis, and wandering pains in the abdomen. The appetite was capricious; at times fairly good, and at other times very poor. She often had nausea, which lasted for a short time. The bowels were constipated, and she was greatly tormented with flatulence. Her ultimate nutrition was poor; she had lost flesh, and on her face there were many large blotches.

The nervous system was very considerably disturbed. Originally of a cheerful disposition, she became irritable and emotional. Sleep was often broken at night, and she had unpleasant dreams. During the day, especially after eating, she became drowsy, but seldom could sleep, if she tried to do so. In other words, she was anæmic and neurasthenic.

She suffered at times from a spasmodic cough, due evidently to deranged innervation. There was no organic disease of the lungs or bronchi. The general treatment was tonic and sedative. Mild laxatives were also given. Locally, the hot-water douche was used, and equal parts of iodine and carbolic acid were applied to the cervix. This did not give any relief to the local symptoms, and her general condition improved very little. The menstrual flow was as free and painful as before.

The curette was used, and some fungous material removed; after this she felt better, and the menstrual flow was more natural. Subsequently she neglected her treatment, and in a few months all the old symptoms returned.

She was anæsthetized, the cervix fully dilated, and curetting employed. A large quantity of polypoid material was removed, the uterus washed out with a five-per-cent solution of carbolic acid and thirty per cent of glycerin and then packed with gauze, which was removed at the end of three days. The corporeal endometritis was completely relieved.

The constitutional treatment was kept up, and an application was made after each menstruation for three months, which arrested the slight catarrh of the cervix.

CHAPTER XI.

SUBINVOLUTION.

Subinvolution of the Uterus after Parturition.—The great increase in the size of the uterus during gestation, and its rapid reduction after delivery, are among the most remarkable phenomena in the animal economy.

The uterus during nine months increases from about two ounces to two pounds in weight during the evolution of gestation, and it is reduced by involution in the short space of two or three weeks. This process of involution (by which the uterus is reduced to its original size) is a transformation and absorption of the tissues. The structural elements of the uterus, which are no longer needed, undergo fatty degeneration and absorption, and are in that way disposed of.

The time required for this involution to take place, and the causes which may interrupt it, have been clearly pointed out by Dr. Alexander Sinclair, of Boston, in vol. iv of the "Transactions of the American Gynecological Society," 1879. Dr. Sinclair gives the results of careful measurements of the uterus in one hundred and eight cases. These measurements were made from twelve to thirty-six days after delivery, the average being sixteen days. In the great majority of these cases the uterus had been reduced to its normal size at the end of three weeks. In one the uterus measured two and one half inches on the twelfth day. This shows the wonderful rapidity with which this involution goes on.

In all the cases in which the involution was retarded, there were present certain morbid states, such as laceration of the perinæum or cervix uteri, metritis, or septicæmia.

These observations of Dr. Sinclair's are of the highest value in showing the time required for the process of involution, and also the conditions which interrupt, retard, or arrest it.

Pathology.—In uncomplicated cases there are no inflammatory products, nor are there any new tissue formations. The structures of the uterus are the same as in the normal state, but developed by gestation. In Dr. Snow Beck's case the microscopical appearances were like those found in the middle period of utero-gestation. In other cases evidences of fatty degeneration have been observed in the muscular tissues.

When the involution has been arrested by puerperal metritis, the products of the inflammation are found. According to Dr. Noeggerath, these products are inflammatory exudations and hyperplasia of the cells of the areolar tissue.

Symptomatology.—I have never observed any symptoms which were specially characteristic of imperfect involution. The history of the delivery and subsequent progress usually presents some fact which would suggest possible subinvolution.

There are usually present leucorrhœa and backache, and pelvic tenesmus upon standing or walking, but all these symptoms occur in other affections.

Physical Signs.—Digital examination shows that the uterus is enlarged and softer than normal. Very often it is low down in the pelvis. The vagina also is found to be enlarged and relaxed. The rule is that if involution is arrested in the uterus it is also arrested in the vagina and in the uterine ligaments. There are many exceptions to this rule, however; as, for example, a laceration of the cervix uteri and perinæum will arrest involution of the cervix and vagina, while the body of the uterus may return through involution to its normal size.

This can be made out easily by the touch in most cases. The sound, used through the speculum, shows the exact size of the uterus, and when that abnormal size occurs after confinement, and is not otherwise accounted for, it is a reliable sign of subinvolution. The cervix and vagina are usually of a deep, bluish-red color, and there is dilatation of the cervical canal, and usually some eversion of the lips of the os externum.

Prognosis.—Recovery may be expected under proper care if treatment is begun early and can be fully carried out, and there are no complications which can not be removed. In case that the tissues are damaged by metritis the case may go on to sclerosis, and become incurable. When the subinvolution is due to injuries of the cervix, the restoration of the injured parts is usually followed by a completion of the involution.

Causation.—Injuries, such as laceration of the cervix and perinæum, and septic infection causing either cellulitis, lymphangitis, or metritis, are the chief causes. Getting up too early after confinement, and engaging in hard work in the erect position, are also liable to arrest this process. All the cases that I have seen were traced to some of the above-named causes.

Treatment.—The management of subinvolution usually falls to the obstetrician in case he is on the watch for it. When not complicated with any well-defined puerperal affection it is apt to pass for a time unnoticed, because it does not give rise to suffering until the patient is about her duties again.

When the patient begins to go about after her confinement, and there is pelvic tenesmus, backache, and leucorrhœa, imperfect involution should be suspected; and, if the physical signs confirm the diagnosis, the patient should be put back to bed, and kept there for a time. If the recumbent posture is not sufficient to restore the uterus to its normal position, artificial support should be used, either by pessary or tampon. The hot-water douche should be employed, and if there is imperfect involution of the vagina and pelvic floor, tannin or sulphate of zinc may be occasionally added to the douche.

In the past, antiphlogistic measures were employed as the chief treatment. Leeches were applied to the cervix, and puncturing and scarifying were employed to abstract blood from the uterus. This depletion is doubtless beneficial when there is well-marked engorgement, and the general state of the patient is good—not anæmic, as is generally the case with these patients.

Local bloodletting should not be employed unless there is extreme congestion, neither should it be repeated more than once or twice. A certain degree of hyperæmia is necessary to the process of involution, and anæmia will arrest the process. Depletion is only admissible in morbid hyperæmia. That it is useful in such cases is beyond doubt. The value of depletion is seen in those who resume the function of menstruation soon after delivery. A profuse menstruation is generally followed by improvement.

I have generally relied upon less depressing measures. While taking care of the general health, I have advised rest, the hot douche, and tincture of iodine applied to the cervix, cervical canal, and upper portion of the vagina. When these have failed, I have used electricity in the same way as in the treatment of uterine fibroids, but not with so strong a current. This agent is one of the most valuable that we have. Massage of the uterus will also be found useful.

In cases of long standing there is usually some injury of the cervix uteri or the pelvic floor; when such is the case, the lacerations must be repaired before involution will be completed.

It is almost needless to add that all complicating conditions, such as endometritis, should have due attention.

Superinvolution of the Uterus after Parturition.—This affection was first described by Sir James Y. Simpson, and illustrated with cases which occurred in his practice.

I presume it must be a very rare condition. I have not seen a case about the diagnosis of which I felt sure. Premature atrophy of the uterus I have seen, due to destructive disease of the ovaries, removal of the ovaries, and certain peculiar states in which the menopause occurred prematurely, but a case not so accounted for has not occurred in my practice. I saw a patient once in consultation, six months after her confinement, who suffered from pain in the abdomen, which was due apparently to adhesions from an old peritonitis. The uterus was very small for one who had borne children, in fact it was below the size of a virgin uterus. The menses had been scanty. I made a diagnosis of superinvolution, and gave the attending physician a brief clinical lecture on the subject. He examined the uterus afterward, and confirmed my statement regarding the size of it. While I felt sure that the pain present, and for which I was consulted, was in no way connected with the small uterus, I took occasion to say that the patient would remain sterile; and I also predicted an early menopause. To my surprise she gave birth to a healthy child, of full size, about one year after I had made the diagnosis.

Perhaps superinvolution, to a certain extent, may not necessarily cause sterility, and my diagnosis may in this case have been correct, but I do not believe so.

Owing to my lack of personal knowledge on this subject, I will here give in full the case reported by Sir James Y. Simpson, in his work on "Diseases of Women":

"The subject of this rare pathological affection began to menstruate at the age of thirteen, and the catamenia recurred regularly every four weeks till she became pregnant when eighteen years old. Utero-gestation went on without any unusual phenomena to the full term; and her parturition was natural but tedious, a male child being born after a labor of seventeen hours. Nothing unusual occurred during her puerperal convalescence and lactation. But subsequent to delivery she never menstruated. She was, however, subject to frequent attacks of diarrhœa, which she herself believed to be generally most severe at recurring monthly intervals; and the dejections were then sometimes tinged with blood.

"Two years after *accouchement* she became a patient in the female ward of the Royal Infirmary, complaining of the state of amenorrhœa, with attendant broken health. She suffered from pain in the back and hypogastrium, with a sensation of weight and pressure in the pelvic region; dysuria; a furred tongue; and a weak compressible pulse, generally beating from 80 to 90 in the minute. She was thin, feeble, and anæmic in appearance. The mammæ were shrunk and flat. For some time before admission she had suffered much from occasional headaches and giddiness; frequent nausea and vomiting; palpitation and occasional rigors.

"On making a vaginal examination, I found the uterus small and mobile. The cervix uteri was much atrophied, and the vaginal portion of it scarcely made any projection into the canal of the vagina. The os uteri was so much contracted as to admit a surgeon's probe with difficulty. It was dilated by a slender bougie being left in for two or three days; and, when the uterine sound was subsequently used, the uterine cavity was found to be only one and a half inch in length, or about an inch less than normal.

"A variety of means was employed with the view of benefiting the general health of the patient, and of exciting action in the uterine system, but with little or no effect.

"Diarrhœa repeatedly occurred during the three or four weeks she remained under my care, requiring the free use of opiates for its restraint; and as the uterine symptoms did not at the time seem to admit of special attention and treatment, the patient was transferred to one of the general wards of the hospital, where she was placed under the care of my colleague, Dr. Bennett.

"During the following month the diarrhœa recurred from time to time very severely. At last anasarca in the lower extremities and albuminuria supervened; ascites followed; and shortly afterward her face and arms became œdematous. About a month after these symptoms appeared delirium at last came on, the fæces passed involuntarily, and ultimately she died in a state of prolonged coma.

"On post-mortem inspection some crude tubercles were found in both lungs, especially in the left. The liver was enlarged, and showed some fatty transformation. The kidneys presented also some stearoid degeneration, and in the right there was in addition a small tubercular abscess. The large intestines were very much thickened in their parietes, and contracted in their caliber, while their mucous membrane was ulcerated in various parts. Along the lower end of the ileum several large ulcerations were seen running circumferentially around the interior of the bowel. One or two ulcerations were also found in the stomach. The uterus was very small, and atrophied in its length and breadth, its size being diminished about a third below the natural standard in all its measurements, and its parietes were correspondingly thin and reduced. The whole length of the uterine cavity from the os to the fundus was not more than one inch and a half, while the normal uterus usually measures in this direction two inches and a half. When a section was made of the posterior wall of the organ, the thickness of its parietes at their deepest or most developed point was not above three lines, instead of the normal measurement of five or six lines. The tissue of the uterus appeared dense and fibrous, and the section of it presented the orifices of numerous small vessels. The ovaries seemed also much atrophied, and smaller than natural. Their tissue was dense and fibrous, and presented no appearance of Graafian vesicles. There was no inflammatory deposit on the peritoneal surface of the uterus or its appendages; but some thick pus, or tubercular matter, existed in the distended cavity of the right Fallopian tube."

CHAPTER XII.

SCLEROSIS OF THE UTERUS.

Fifteen years ago I employed this term to designate an affection of the uterus, which up to that time had been known by a variety of names—such as chronic interstitial metritis, hypertrophy, chronic inflammatory hypertrophy, and areolar hyperplasia. Subsequently Gallard used the same term in the same way.

This affection of the uterus is a change of structure produced by a pre-existing inflammation or derangement of nutrition, and may be more properly considered as the product of morbid action, rather than active disease. The term which I have selected, therefore, more clearly indicates the true nature of the affection than the names of the affections or processes which produce it, and by which it has heretofore been designated.

Pathology.—This comprises certain changes of structure, mostly of the middle coat of the uterus, which, as already stated, have been caused by preceding morbid processes.

This change of structure consists in an excess of connective tissue, the result of an areolar hyperplasia. This element in the structure of the uterine walls rapidly increases, encroaching upon the muscular element, and more especially upon the blood-vessels in the connective tissue. The result is marked increase in the density of the tissues, and anæmia from pressure upon the vessels. There is frequently an increase in the size of the whole organ, but in some cases the uterus is not enlarged. In fact, the uterus may notably diminish in size, when the hyperplasia is sufficient to cause atrophy of the other tissues of the uterus.

The histological composition of the tissues differs in different cases, and in different stages of the development of the affection.

In those cases which have their genesis in puerperal metritis there is generally at first, in addition to hyperplasia of connective tissue, a fatty degeneration of the muscular tissue, which has not been disposed of by the process of involution. There are, also, in some cases, some of the products of the inflammation in the form of exudation into the tissues. All these give the uterus its increase in size, which to some extent is permanent, although the organ may diminish very much in time.

The hyperplasia of the connective tissue causes atrophy of the other tissues, and to that extent the uterus is reduced in size. When the sclerosis follows non-puerperal metritis the uterus, which during the stage of inflammatory engorgement was larger than normal, may become reduced to, or even below, its normal size. This is more likely to occur when the hyperplasia is extensive, and involves all the tissues of the uterus and their blood-vessels.

Sclerosis may be general or local. When due to puerperal or chronic metritis, or to deranged nutrition from long-continued congestion, the whole organ shares in the morbid process. When it is due to some injury and inflammation, or deranged nutrition of the cervix, the body may remain normal. Circumscribed patches of sclerosis in the body or cervix have not been found.

Finally, this is a permanent affection. When once the changes of structure have taken place they remain, to a certain extent at least. There is no tendency to complete restoration of the normal tissue. There may be a slight diminution of the size of the uterus. I am inclined to think that even at the menopause, the period at which almost all uterine affections subside, this lingers, and possibly remains always.

I have had an opportunity of observing several cases some time after the change of life, and the uterus in all of them was larger than it should be. Dr. Noeggerath claimed that sclerosis, or chronic metritis, as he called it, predisposed to cancer of the uterus. This may be so. There is in this affection a change of structure, and, according to the rule in pathology, a consequent lowering of the vitality of the part, and a predisposition to further degeneration.

Symptomatology.—The clinical history of this affection differs in many points from that of other forms of uterine disease, but there are no symptoms that are diagnostic.

There is more marked constitutional disturbance in the pronounced cases than is found in the average inflammatory affections. This may be due largely to the exhausting effect of the disease which preceded the sclerosis—this being quite sufficient to keep up the general ill-health.

There is derangement of menstruation, usually amenorrhœa. In well-marked cases neuralgic pains in the uterus are frequently present, which are much worse at the menstrual period. The pain at this time often begins before the flow and continues throughout the whole period, and sometimes a day or so after. In some cases the pain is acute and irregular, in others of a dull, aching character, and in a few both varieties of pain coexist. The form of suffering may be likened to a very great aggravation of all the disagreeable feelings of an ordinary menstruation.

The clinical history (so far as symptoms are concerned) in the inter-menstrual period closely resembles that of corporeal endometritis.

Physical Signs.—These are briefly as follows: Anæmia of the uterus, indicated by the pale appearance of the cervix, as seen through the speculum, and suggested by amenorrhœa; enlargement and induration of the uterine walls, as detected by touch and sound; increased length of the cavity of the uterus without increase of the lateral and antero-posterior diameters; slight retraction of the lips of the os externum, and the small size of the cervical canal compared with the size of the walls of the cervix.

The hardness of the uterus is a most valuable sign, but one that is not easily detected. To the touch, the uterus does not in all cases appear to be more dense than the virgin uterus, but where it is enlarged it is softer in consistency, except in sclerosis; hence, when there is an increase in size and induration, not due to fibroma, the evidence is in favor of sclerosis.

In the great majority of cases the uterus is more tender than in any other affection, except acute metritis, and endometritis with flexion. The touch excites this sensitiveness, and the passage of the sound causes marked pain.

Prognosis.—Sclerosis being a permanent change of structure, recovery with or without treatment is the exception. By relieving any complication which may be present, such as displacement, the patient may be made sufficiently comfortable to reach the menopause, and then recovery may take place.

Sclerosis of the cervix may be relieved to a great extent, sometimes completely, by trachelorrhaphy, if the cervix has been lacerated.

In case the cervix has not been injured its size can be reduced, and the tissues may become softened and the nutrition improved by taking out a V-shaped piece on each side, and bringing the parts together, as in the operation for laceration.

Causation.—The causes of this affection, given in the literature of medicine, are the same as those of almost all other inflammatory diseases of the uterus. In the cases which have come under my own observation, they were either acute metritis following child-bearing, or miscarriage or long-continued general endometritis, and injuries to the cervix during labor.

This leads me to believe that these are the only causes of this affection. In fact, as sclerosis is the result of a deranged nutrition of an inflammatory nature, it follows that the cause must be a preceding metritis, partial or general.

Treatment.—Sclerosis is, of course, a preventable disease in the majority of cases. If the inflammatory affections which lead to it are carefully managed the structural changes will be avoided, excepting in severe puerperal metritis.

When once the changes in the tissues which constitute true sclerosis have occurred, it is still a question whether any known treatment can entirely relieve it. As already stated in the prognosis, benefit may be obtained by removing complications, such as laceration of the cervix. In the hope of causing absorption of the areolar tissue, mercury, iodine, copper, and belladonna have all been employed; and, it is needless to say, that the hot-water douche has also been frequently tried.

Dr. Noeggerath, of New York, recommends amputation of the cervix, permitting the stump to heal by granulation instead of covering it over with vaginal mucous membrane. This he deems advisable, not only in the hope of relieving the sclerosis and to counteract the effect of the operation, but also to prevent the development of malignant disease.

So far as my own personal observation goes, I am obliged to say that I have not seen much benefit from any such treatment, and have come to look upon the disease as an incurable one.

There is one remedy which promises to be useful, and that is electricity; but I have not had experience enough in its use to enable me to speak definitely regarding it. I may say, however, that it promises more than anything else that I am familiar with, but more extensive observation is necessary to determine its true value.

ILLUSTRATIVE CASES.

Sclerosis of the Cervix Uteri.—This case, whose history I give, is one of the very few that I have seen of sclerosis of the cervix, not accompanied with laceration. It is possible that the cervix had been lacerated during one of the patient's confinements, and that the wound had healed, but I could not find any trace of such injury.

The patient was thirty-one years old, and had borne four children; the last one three years before the time when this history was taken. She did not recover from this confinement as well as she had in previous ones, but I could not get any history of serious puerperal disease at that time.

After the confinement her health was poor, and she gave the history of some uterine disease. Her menstruation was normal, but attended with more pelvic pain than formerly. She had suffered from leucorrhœa, but this had gradually diminished. At my first examination I found the body of the uterus normal, but the cervix was much enlarged and hard to the touch; the os was circular and small in proportion to the size of the cervix—it was an inch and three quarters in diameter. To the touch the cervix appeared to be as large as the body of the uterus. There was no other lesion found except that there was prolapsus in a slight degree. She was treated with the hot douche and applications of tincture of iodine, but without effect. I then removed, with the hawkbill scissors, a large V-shaped piece from the lateral walls of the cervix, and closed the wound with sutures, making an operation like that for bilateral laceration. Healing was prompt and complete, and the size of the cervix—at least the vaginal portion of it—was much reduced.

She was better for the operation, and at the end of one year I found that the whole cervix was nearly of its normal size, and that the tissues were soft and more vascular. The operation had the effect of changing the nutrition of the parts, and causing absorption of the new tissue.

In sclerosed tissue due to laceration of the cervix, I have frequently seen such favorable changes after operations.

Sclerosis Uteri, following Puerperal Metritis.—This patient was thirty-five years old, had been pregnant five times, and given birth to four living children. While pregnant at the seventh month with her fourth child she received an injury which caused her to give birth to a dead fœtus a few days afterward.

During her fifth pregnancy she received a shock from seeing a friend in a convulsion; labor came on immediately, and she was delivered of a seven months' child. Soon after her confinement she complained of pain and tenderness in the region of the uterus, followed by fever. These symptoms extended over a period of three weeks, and there can be little doubt, from the history given, that she had acute puerperal metritis, which left her health permanently impaired. Since that time her menses have been irregular, scanty, and attended with pain. At times she has a menstrual molimen, but no catamenial flow. During the last year she has menstruated twice, the last time three months ago. This is the previous history of the case.

She now suffers from extreme debility and anæmia, which is shown by her general appearance; she also complains of ill-defined aching pains throughout the pelvis, and in the sacral region; occasionally she has very slight leucorrhœa. Her digestive organs are also very much deranged, and her nervous system, from the joint action of disease and drugs, is a miserable wreck.

By physical exploration I find that the uterus is enlarged, being three quarters of an inch longer than normal. The body and cervix are tender to the touch, and the sound carried into the cavity gives extreme pain. The cervix is indurated and smooth, and the os is smaller and more circular than is usually found in those who have borne children.

Exploring the cavity with the sound, I find that while the longer diameter is considerably increased the antero-posterior and lateral diameters are shortened. The uterine walls appear to lie in close contiguity, so that it is impossible to turn the sound far in any direction. These signs obtained by the probe are of vast importance, for they indicate clearly that the enlargement of the uterus is due to an actual increase in the walls of the organ, and not a mere expansion of its cavity. In other words, the growth is concentric, not eccentric.

The cervix, as seen through the speculum, is notably pale; the os is small, with its lips curved inward. This retraction, or drawing inward of the os, is confirmatory of the opinion that the walls of the cervix are enlarged more than the mucous membrane of the cavity. When the mucous membrane of the cervix is swollen, and the walls remain normal, the lips are enlarged or pouting.

Briefly, then, the physical signs indicate that there exists a condition of unusual hardness and enlargement of the uterine walls, while the relative size of the cavity is lessened. The uterus is also anæmic, as can be seen from a glance at the cervix.

It should be noted that this patient has amenorrhœa—a condition that is much more common in the young than in those who have borne children, and is seldom found in connection with enlargement of the uterus.

This form of sclerosis presents many points of resemblance to that of general endometritis, but they are essentially different.

Contrasting sclerosis with endometritis gives results as follows: The one begins with acute inflammation of the uterus, the other does not; in the one there is amenorrhœa, in the other menorrhagia; in the one the uterine walls are enlarged and the cavity diminished, while the reverse of this obtains in the other; the uterus in the one is indurated and anæmic, in the other it is relaxed and highly congested. These are plain outline distinctions, easily recognized, and characteristic of almost opposite pathological conditions.

Treatment and Prognosis of the Case.—After each menstruation an effort was made, either with leeches or puncture, to supplement the flow by depletion. This was not successful. It was difficult to extract blood from the anæmic tissues, and what was accomplished did not even relieve the patient. Blistering the cervix was tried with some apparent benefit; cantharidal collodion was applied, and a tampon used to protect the vagina until vesication should take place. This was repeated several times at intervals of two weeks, and the patient had less pain in the uterus and gained a little, but whether from the blistering or tonics and general supporting treatment, could not be stated with certainty. Iodine was next tried; it was applied to the canal and vaginal surface of the cervix thoroughly twice a week, but she did not seem to improve much.

About this time some one in England reported good results in obstinate uterine affections from vaginal suppositories containing mercury. I tried these until slight salivation was produced. Some harm, but no benefit was the result. Finally, I may state that some relief was obtained, but not much. She profited from constitutional treatment, but not much if any from local medication. Considerable relief was obtained by wearing a Peaslee's ring-pessary, which gave a little support to the uterus, but it caused irritation, and had to be removed.

When she was greatly fatigued, and suffered more pain than usual, a cotton tampon gave relief also.

I lost sight of the patient for a number of years, but recently she returned to the city and called to see me about some trouble of her digestion. She told me then that she never fully recovered until the menopause, which occurred at forty-six. Since that time she had been fairly well.

The uterus, though larger than it should have been at her age, was smaller than when under observation, fourteen years before.

Sclerosis Uteri, resulting from Endometritis and General Congestion.—The patient was twenty-four years old when first seen. She was highly refined, and of a well-marked nervous temperament. She began to menstruate at the age of fourteen, and had continued so to do regularly, but had always had slight pain at the menstrual periods, and was unusually nervous and irritable at such times. She was married at twenty-two, and soon after began to have backache, leucorrhœa, and more pain than formerly during menstruation, and the flow was more free.

These symptoms gradually increased, and her general health failed considerably. Pain in the uterus and general pelvic tenesmus were added to her other symptoms, and after suffering for two years in this way she came under my care.

I then found the uterus larger than it should have been, and its tissues softer than normal, especially those of the cervix. The canal of the cervix was larger than normal, and the whole uterus was tender to the touch. Passing the sound caused severe pain. There was considerable erosion of the cervix, the os externum was dilated, and the mucous membrane was highly congested. There was a free muco-purulent discharge which irritated the vagina and vulva.

The usual local treatment for endometritis was employed, and the ordinary means were used to improve her general health. Applications of nitrate of silver (which I used at that time, according to the advice of my former teachers) caused great pain, and were given up for milder means, such as tincture of iodine, and tannin and glycerin. She improved very slowly, and about ten months after she came under my care she went to Europe with her husband, who was called there on business. She remained in England for about five years, and occasionally was treated by a distinguished physician there.

Excepting various kinds of vaginal injections she had no local treatment while in England. Her general health improved very much, and she bore her local troubles without complaint.

Upon her return to this country, I found that her menstrual flow had diminished until she had less than before her marriage. There was very little leucorrhœa, and less pelvic tenesmus. There was quite as severe dysmenorrhœa, and she had intermittent pain in the uterus of a neuralgic character. The uterus, taken as a whole, was a little smaller, and indurated to the touch; the canal of the cervix and the cavity of the body were decidedly diminished in caliber, and still tender to the touch of the uterine sound. The os externum was contracted, and its lips in place of being everted as formerly were now slightly curved inward. In place of the soft vascular condition of the cervix, present when she was first examined, it was now round, well defined, and rather anæmic in appearance.

It was only by referring to my notes of the case, taken at the first examination, that I could fully realize the change which had taken place.

I treated her for a short time in the hope of relieving her dysmenorrhœa and uterine pains, but without much benefit; and, as she was able to get along by resting at her menstrual period, she was dismissed with the advice to await the menopause, when in all probability she would be relieved.

CHAPTER XIII.

MEMBRANOUS DYSMENORRHŒA.

I SHOULD prefer to call this affection membranous menorrhœa, believing that the term would be more appropriate, but as the original name has been longer in use, and is familiar to the profession, I shall not attempt to change it.

This is an affection which, although rather rare, commands very urgently the attention of the gynecologist, because of the dreadful suffering which it gives rise to, and the obstinacy with which it has heretofore resisted treatment. There is a marked uniformity about this disease. In its pathology and clinical history it varies but little in different cases. A number of affections resemble it to a limited extent, but it stands out well defined, and is easily detected by the experienced diagnostician.

Pathology.—An exfoliation in mass of the mucous membrane of the cavity of the body of the uterus at the menstrual period is the chief lesion in this affection. Microscopically, the mass presents all the histological elements of the true mucous membrane of the uterus, including the utricular glands, unchanged by any new or abnormal elements. When it is expelled entire, it represents a complete cast of the cavity of the uterus, and is triangular, with an irregular opening at each of the angles, the one representing the internal os uteri, and the others corresponding to the ostia of the Fallopian tubes. This membrane is rather ragged on the outer surface, but smooth on the inner, and looks exactly as the lining membrane of the uterus does when in position. The size is usually about an inch long and less than that in width, and is generally somewhat larger than the normal proportions of the cavity of the uterus; but this is not always the case. In this respect it is like the decidua of pregnancy; in fact, in general appearance it closely resembles the decidua vera, but there is a decided difference in its microscopic elements, sufficient at least to distinguish. This similarity of the two membranes has led to their being called the decidua gravida and the decidua menstrualis, the former being the mucous membrane as seen in abortion at a very early stage of gestation, the other the membrane as thrown off at menstruation in this morbid form.

Comparing the changes which the mucous membrane undergoes in membranous dysmenorrhœa with its changes in normal menstruation, the difference is as follows: In normal menstruation, if we accept the views of Dr. Williams, of London, the whole mucous membrane undergoes fatty degeneration, disintegration, and elimination; whereas in membranous dysmenorrhœa the mucous membrane becomes separated from the walls of the uterus without being changed or disintegrated; exfoliation and expulsion simply occur. The way in which the separation of the mucous membrane takes place is not positively known. It is presumed, however, that fatty degeneration in the deeper structures of the membrane takes place, and thereby it becomes detached from the uterus. It is possible, also, that the capillary hæmorrhage, instead of occurring on the free surface of the membrane, takes place in the deeper structures, and in that way dissects off the membrane. This, however, is hypothetical, and needs confirmation. Sometimes the membrane is expelled in shreds, which suggests that the exfoliation either occurs in spots or sections, or else that the membrane is completely separated from the uterus, but becomes broken up either during expulsion or in handling it afterward. It is much more probable that it is completely exfoliated and broken up subsequently than that it is separated in circumscribed patches. All these facts lead to the conclusion that the affection is a perversion of nutrition and function rather than an organic disease, inflammatory or otherwise, which gives rise to this peculiar condition of the mucous membrane at menstruation. It is clearly evident that there is nothing pathological in the condition of the mucous membrane itself, but that the whole morbid process consists in the separation of the membrane in mass, in place of disintegration, which is the normal character of the mucous membrane in menstruation. There are other views regarding the pathology of this affection: one, that it is the result of gestation, which is arrested at a very early stage, and that the membrane thrown off is really a decidua vera. That this theory is fallacious will be seen when the physical signs of this affection are discussed.

The idea that it is an inflammatory affection is not well sustained. No such product or result of inflammation is found elsewhere in the mucous membranes of the body, nor is it necessary that inflammation of any part of the uterus should be present in order to produce membranous dysmenorrhœa.

Associated with this membranous dysmenorrhœa we occasionally find inflammatory conditions, but not of the mucous membrane of the cavity of the body. There may be, and often is, a general hyperæmia of the uterus and vagina, but usually it is not greater than that which is seen in normal menstruation.

There is occasionally, in cases of long standing, cervical endometritis, but this does not extend to the body of the uterus. In fact, I believe that a well-defined endometritis can not occur at the same time as membranous dysmenorrhœa. This affection, then, is certainly *sui generis*, and is not the result of inflammation in any form or in any stage of the inflammatory process; neither is it a utero-gestation ending in abortion at a very early stage of pregnancy, as some have maintained; neither does the membrane partake of the nature of any of the morbid neoplasms which occur in mucous membranes elsewhere in the body.

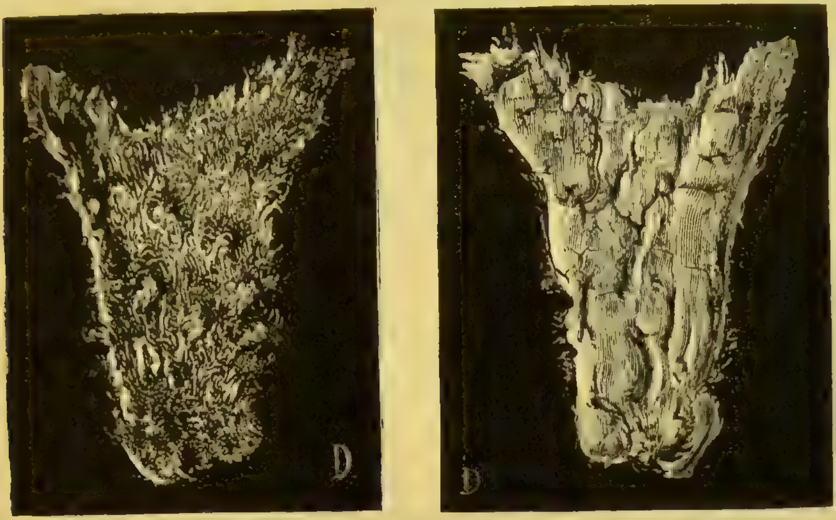
The mucous membrane in this affection is developed in the natural manner after each menstruation, and the gross appearances and histological composition of this structure show that it is normal, and differs in no way from the mucous membrane of the uterus up to the time when the menstrual flow is about to begin. Perhaps there is, in some cases, an increase in the quantity of the membrane, but only to a very limited extent, if at all. In short, the only pathology connected with this affection is in the manner in which the membrane is thrown off.

Symptomatology.—This affection occurs in single and married women—about as often in one class as the other, perhaps. It also occurs in those who have borne children, but in most of the cases that I have seen in married women the patients have been sterile. The recurrence of the menstruation is generally regular; sometimes it is delayed, and sometimes there is a sense of pelvic discomfort before the menstrual flow, but not always. The chief symptom is the pain which comes on usually during the first day, sometimes later, and increases in severity, and is somewhat intermittent in character until the membrane is expelled, when it rather abruptly subsides.

The flow sometimes is scanty previous to the expulsion of the membrane, and after that it is generally quite free; at times abnormally so, and occasionally small clots are passed.

Sometimes there is a leucorrhœal discharge succeeding the menstrual flow, the discharge being occasionally tinged with blood. In other cases the menstrual flow subsides after the expulsion of the membrane, and no leucorrhœa of any account occurs afterward.

There is really nothing in the clinical history of this affection by which it can be positively distinguished from dysmenorrhœa due to other causes. Hence the diagnosis must always depend upon the physical signs.



FIGS. 103, 104.—The two sides of a half-membrane from a multipara; from the cavity of the body. The slight puckering present is due to alcohol.

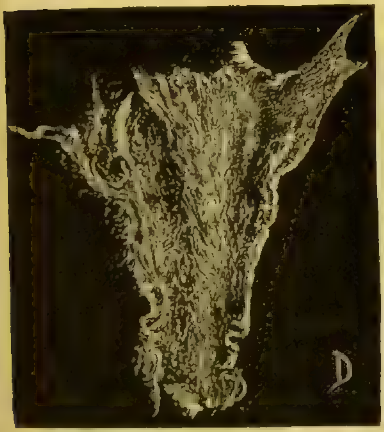


FIG. 105.—Half a membrane from a virgin; from the body of the uterus only.

Physical Signs.—In order to make a diagnosis, it is absolutely necessary that the membrane expelled should be preserved and examined. The gross appearances of the specimen are usually all that is necessary to satisfy the diagnostician regarding the nature of the affection, but in cases where there is a doubt the microscope must be called in to aid in the diagnosis.

The morbid materials expelled from the uterus which simulate the membrane produced in this affection are the decidua expelled in abortion in the earliest stages of pregnancy; the masses of fibrin which have formed in the uterus in menorrhagia; very dense masses of secretion from the cervix; and the membranous-looking shreds expelled from the cervix and vagina after astringent or caustic applications.

The decidua in early abortion is most difficult to distinguish from the menstrual membrane. In the early abortion the membrane expelled is usually larger and more ovoid or round, and not so markedly triangular as the decidua of menstruation, and is also thicker, and usually is accompanied with villi of the chorion. If there is still a doubt, the microscope reveals the fact that the menstrual membrane possesses only small cells, while those of the decidua-vera membrane are so great as to be easily distinguished. There is a decided microscopic difference in the epithelium, the tubes, and the inter-glandular tissue. This difference between the two membranes is not only in the decidua of early abortion, but also in the decidua of extra-uterine pregnancy. In being thus able to distinguish between the decidua of pregnancy and the membrane of menstruation, the only great difficulty in the diagnosis is overcome.

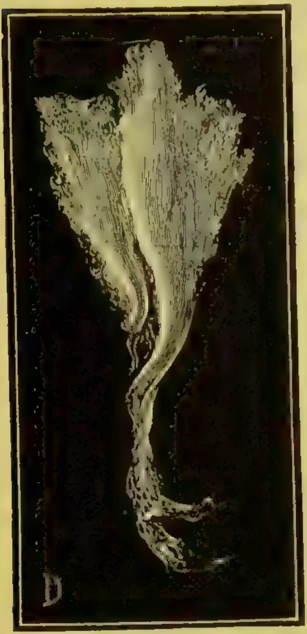


FIG. 106.—A cast from a virgin, where the cervix is also involved.

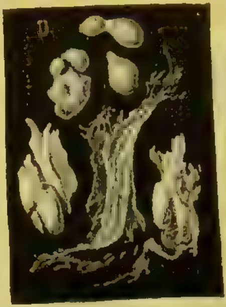


FIG. 107. — Fragments of membrane in the condition which they are often expelled.

Inspection will enable one to distinguish shreds of fibrin, masses of unusually dense secretion of the cervix, and shreds from the cervix and the vagina after astringent applications from the menstrual membrane.

The diagnosis can be made with great certainty.

Causation.—Discarding the current views regarding membranous dysmenorrhœa—that is, that it is due to inflammation, or else the result of gestation—one is left without any very rational view to offer

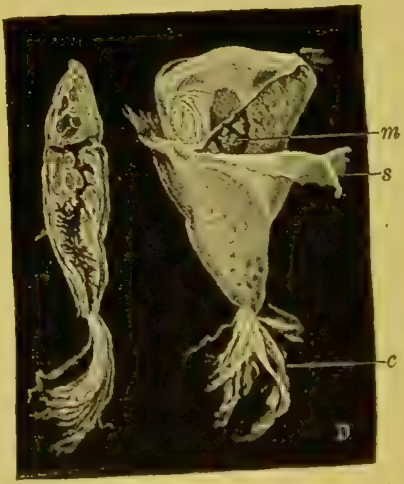


FIG. 108.—A cast which might be mistaken for a product of conception: *m*, shaggy interior; *s*, film of membrane covering it; *c*, filaments from cervix.

regarding its causation. While it is not, perhaps, the part of wisdom to discredit the accepted views on any question in medicine until one has something more reliable to offer, still, if the causes assigned can be readily shown to be incorrect, it is infinitely better and safer to be entirely in ignorance of the causes of things than to attribute them to the wrong causes. Fortunately, however, while I find myself at variance with most of the recent authorities regarding the cause of this affection, I am in perfect harmony with the views of Dr. Oldham, who was the first to discover "dysmenorrhœa membranacea."

Dr. Oldham distinctly pointed out the characteristics of this affection, and stated that the membrane is formed under abnormal ovarian stimulus; and I am fully satisfied that he was not only the discoverer of the disease, but also conceived the true idea regarding the cause of it—viz., some undue ovarian influence or sexual excitation. In other words, it would appear to be some derangement of innervation and nutrition.

Taking this view of the causation, I expect to find myself in harmony with the neurologists at least. This class of specialists manifests a willingness to trace many diseases originally to some derangement of the nervous system, when they find anything like good reasons for so doing. Hence, I expect their support in choosing, as I do, to believe that the starting-point in the pathology of this affection must be some derangement of innervation produced by disease or functional disturbance of the ovaries. Confirmation of this view regarding the cause of membranous dysmenorrhœa may be found in studying the agencies which give rise to other morbid states of the uterus, like the fibroid growth, for example, which in its anatomical elements does not differ especially from the tissues of the uterus from which it springs; and, if we could find the cause of this deviation from healthy nutrition, it might be applicable to the disease under discussion. But, unfortunately, the causes of fibroid tumors given in our literature are unsatisfactory, and by no means well sustained.

From the fact that uterine fibroids are more common in sterile women than in others, it would appear that sterility predisposes to their development, and perhaps no better explanation of the cause of these growths has ever been given than that of my somewhat humorous friend, who said that "the uterus, being prepared for normal work and not finding it to do, took up the development of fibroids as a sort of occupation for its formative powers." May it not, then, be that a well-defined predisposition to reproduction, uncalled for by gestation, excites this morbid action on the part of the uterus which leads to this abnormal exfoliation of its mucous membrane? This view might at least be entertained, because in other cases, when we are unable to detect the cause of a disease in something that is tangible, we usually attribute it to deranged innervation and consequent malnutrition. This view of the causation is, to some extent, sustained by the effect of medicines upon the lesions. This affection has always been recognized as one that is often difficult to cure, many times incurable, in the hands of the most competent physicians and surgeons. This possibly may have been due to misapprehension of the nature and cause of the disease, and hence fallacious therapeutics, rather than to the incurable character of the disease.

In favor of this line of thought I may state that the patients whom I have treated in years past, on the theory that the cause was inflammatory, have derived little benefit, while those who were treated for deranged innervation, malnutrition, and undue ovarian excitation, have made very much better progress. I am inclined to attribute most of the trouble to ovarian influence, the condition of the ovaries being that of an undue nerve excitation and possible congestion. I have been led to this belief by two facts: that the majority of the patients that I have seen have been subjects of a highly nervous organization, and in most of them there has been tenderness of the ovaries, and pain at times, without there being any evidence of ovaritis.

The rheumatic diathesis is said to favor this affection, and it is possible that this may be so, although I am unable to recall any of my patients as being rheumatic; neither have I been able to trace it to the tubercular or strumous diathesis, nor to syphilis. It is certain, however, that, if either of these conditions existed, it would have its influence in helping to keep up the uterine trouble, and every effort should therefore be made to relieve it by treatment.

Treatment.—The treatment of this affection is necessarily both palliative and curative. While the patient is suffering during the expulsion of the membrane, it is very necessary to relieve the pain as far as possible. This, of course, can be most promptly done by the use of opium, which should be avoided if possible, however, because of its after-effects. Sodium salicylate and antipyrine, five grains each, may be given when the stomach is empty.

Chloral hydrate answers fairly well in some cases. I am not sure that it has any advantages over chloroform, camphor, and belladonna, or conium and cannabis Indica; in fact, in the majority of cases one has an opportunity to try several agents, and, of course, the patient will decide which gives most relief. Indications for general treatment are to quiet all nervous disturbance and to improve the general nutrition of the mucous membrane. It so happens that when the first part is attended to the latter will follow in due order.

To quiet the nervous irritation and disturbance there is nothing that equals the bromide of sodium. This should be given in twenty- or thirty-grain doses three times a day for ten days or two weeks before the menstrual period. And, if the pain is not severe enough to require the addition of some of the remedies already named to relieve it, the bromide may be continued throughout the menstrual period and several days after. From this it would appear that the bromide is to be used continuously; but one or two weeks in each month it can be omitted. When the bromide has been employed for some time, and it seems desirable to give it up, conium may be administered in moderate doses combined with camphor, if the patient is weak. If there is any evidence of the rheumatic diathesis, the bromide of lithium should be given. Next to quieting the nervous system, any debility that may exist should be overcome by nerve tonics. Undue nervous excitation so often goes hand in hand with nervous depression that in many cases it is necessary to combine the tonic and sedative treatment. All the remedies which may be used need not be here mentioned. In regard to the modification of nutrition, it need only be said that any accompanying derangements of the digestive organs that may be found should receive careful attention; but this hardly need be mentioned in this connection.

My rule of treatment has been, after subduing all nervous disturbances, to put the patient upon the iodide of sodium in case she is in fair strength and inclined to flesh. If there is anæmia, I prefer the iodide of iron. If these do not accomplish the object, I employ mercury, giving it in small doses, never continuing it long enough to produce salivation, carefully watching to avoid this. In cases of anæmia, where I have feared the debilitating effect of this alterative, I have given the bichloride of mercury with iron. After keeping them upon this treatment until I could see some evidence of its effects, I have then put them upon iodine and arsenic.

In regard to local treatment, I have been entirely guided by the views of the pathology as expressed above, and have therefore employed alteratives and sedatives almost exclusively. Of these I have found iodoform most effectual. I have also used iodine and mercury with advantage. In cases where I have found any complications

I have carefully attended to them, restoring displacements and correcting flexions, and so on. When the canal has been constricted, free dilatation and packing with gauze have been efficient.

When the congestion which occurs at the menstrual period has not subsided in a few days, I have employed the warm-water douche. After this, I have applied to the cavity of the uterus small bougies of cocoa-butter with as much iodoform as they would take up. Three or four grains of iodoform mixed with vaseline that has been liquefied by heat, and introduced through the pipette, is perhaps the best method of applying it. This has been introduced once a week or once every five days. When there has been much tenderness, and the use of the pencils has caused pain, I formerly used aconite and opium and iodine; this I have introduced into the cavity of the uterus. I am now trying cocaine to subdue the tenderness as a preparatory means to the use of the iodoform. But so far this new remedy has not been a perfect success.

In cases where this has failed and the uterus was not especially sensitive to intra-uterine medication, I have instilled into the uterine cavity a few drops of a 5-per-cent solution of carbolic acid, making one application a few days after the menstrual flow and not repeating it until the next period. In the interval I have used the iodoform. I have also used the fluid extract of conium and hydrastis Canadensis; but this I have found gives more pain than any of the other applications that I have used; and so of late I have used an infusion of the hydrastis alone, which appears to answer as well and gives less pain.

HISTORY OF CASES.

Case I. **Membranous Dysmenorrhœa in a Married Lady who was never Pregnant.**—This patient was forty-one years of age, of good constitution, and had been married eight years. She began to menstruate at thirteen, and continued to do so regularly and normally until she was twenty-one; then she began to have occasional pain, about the menstrual period, in the region of the ovaries. About a year after this she began to have severe uterine pains during the menses, and states that she occasionally passed masses that looked like membrane from the uterus; they were small, however, and did not appear at each period.

After her marriage the pain at the menstrual periods became worse, and almost every month she passed a membranous cast of the uterus. The usual history of each menstruation is that the flow begins not very free, and, after continuing for about five hours, the pain becomes very intense and lasts from three to eight hours, when she expels the membrane and the pain subsides, the flow continuing for a day or a day and a half after the membrane has been expelled.

The flow, taken altogether, is not profuse, and only lasts from two to two and a half days, while formerly—that is, before her dysmenorrhœa began—it used to continue from four to five days. When first seen, her general health was good, but she was rather hysterical and nervous, and was somewhat depressed and disappointed because she had not had children.

She described the suffering at her menstrual periods as something unbearable, although it did not last more than a few hours at a time. She was first examined midway between the menstrual periods. The uterus was then found to be normal in size and in good position. The internal os was rather sensitive and appeared to be slightly contracted; there was also a distended Nabothian gland in the middle third of the cervical canal, but the uterus presented a normal appearance in every other respect. There was no congestion; in fact, at this time the mucous membrane appeared rather anæmic.

The diagnosis was left an open question until the next menstrual period, when I obtained the membrane expelled and had it examined by my friend Professor Frank Ferguson. His report stated that the specimen was uterine mucous membrane unchanged in its histological composition. This settled the question of diagnosis.

Careful inquiry elicited the fact that she had never been pregnant, so far as I could rely upon her testimony, which I believe to be accurate because of her great desire to have children. I also learned that on several occasions she had lived apart from her husband, who was of necessity absent on business for several months at a time, and that she suffered just the same, and at each month there was an expulsion of membrane, showing conclusively that there was no possibility of mistaking this affection for pregnancy and abortion.

The treatment consisted, first, in placing her upon the following mixture: Half a grain of the bichloride of mercury, one drachm of the solution of the chloride of arsenic, three drachms of the tincture of iron in a three-ounce mixture of sirup and water. A teaspoonful of this was given, well diluted, after each meal. At the same time the internal os was incised superficially in three places, dividing equally the circumference of the canal, and the distended Nabothian follicle was punctured and evacuated.

A week after this a sound was introduced of full size, and there was less tenderness; the tincture of iodine was then applied from just within the internal os outward. At the next menstrual period she had less pain, but it lasted just as long, and she passed a membrane unchanged, except that it did not appear so thick as formerly.

From this onward the local treatment consisted in passing a full-sized sound just beyond the internal os directly after the menstrual period, and again in two weeks, and in nearly every six days about two grains of iodoform mixed with vaseline were passed into the cavity of the uterus, well up toward the fundus. This local treatment was continued without interruption for three months, and the first prescription, after it had been taken for two weeks, was followed by the iodide of iron, a grain and a half three times a day.

After the second month, and at the third menstrual period from the time that treatment began, she had no pain and passed no membrane. At the next period she passed several shreds, but nothing like a complete cast of the uterus.

The constitutional treatment, that is, alternating between the first prescription of mercury and arsenic and the iodide of iron, giving first one for two weeks, and then the other, was continued for two months longer. The application of the iodoform was continued for one month longer, once every week, and once after her menstruation, at the end of the fourth month of the treatment. Since that time she has had no further trouble; her menses are regular, lasting about three days, and entirely without pain or any discharge of membrane.

That was her record at least one year after she gave up treatment, since which time I have not heard from her.

Case II. **Membranous Dysmenorrhœa occurring after Treatment for Anteflexion and One Miscarriage.**—A lady of very high culture and over-refinement, of a well-marked nervous temperament, but otherwise of good constitution, came under my observation when twenty-eight years of age; she had then been married a year and a half. She menstruated first at fourteen years, and continued to do so regularly, but with pain from the very beginning. The pain usually began a day or so before the flow and gradually diminished after. Her suffering at each period gradually increased until her marriage, when it became more severe. This, and the fact that she remained sterile, induced her to seek advice. I found her suffering from anteflexion of the body of the uterus and cervical endometritis; there was also tenderness of the left ovary on pressure. She was treated for the flexion, and completely recovered. The dysmenorrhœa was entirely relieved, and she became pregnant. During her pregnancy she suffered very much from morning sickness, and at the end of the third month began to show some signs of septicæmia; she then miscarried, and the ovum was found to be macerated, and probably had been dead *in utero* for two weeks. She recovered from this and was quite well for about a year, when her dysmenorrhœa returned; she then returned to be treated for what she supposed to be a recurrence of her former trouble, but I found no evidence of the former flexion. But, on inquiry, I found that she passed at each period a membranous cast of the uterus. The patient thought little of this, because in former years, while suffering from the dysmenorrhœa caused by flexion, she occasionally passed small clots which looked somewhat membranous in character, but no doubt were simply blood-clots.

She was placed upon treatment similar to that employed in the first case reported, except that there was no necessity for enlarging the internal os as in the former case, the only difference in the local treatment being that I used iodine in place of iodoform during the last two months of the treatment; and once, immediately after the menstrual period, I applied a mild solution of carbolic acid to the uterine cavity.

She did not again pass any membrane after the third month of treatment, and her pain from menstruation entirely disappeared.

She was dismissed at the end of four months, and two months afterward reported that she was pregnant. Three months after that time she was examined and found to be so, and was progressing well. Since that time I have not seen her, but have heard that she gave birth to a healthy child.

CASE III. **Membranous Dysmenorrhœa treated by Dr. Fordyce Barker, of New York; Complete Recovery.**—I give the history of the following case for two reasons: First, to show that iodoform was employed in the local treatment, and that the patient's recovery was complete; and also to take the opportunity of stating that I believe that Dr. Barker was the first to employ this agent.

The history is not altogether complete, because I obtained it from the patient herself, who was unable to tell all that was done for her; but I know positively that she suffered from dysmenorrhœa, and that she entirely recovered under the care of Dr. Barker, and has remained well for a number of years.

This was an educated lady of a well-marked nervous temperament; she began to menstruate at thirteen, and continued to do so normally until she was twenty-six years of age. At that time she was said to have had an acute attack of ovaritis, and after recovering from that she had dysmenorrhœa.

The character of the pain at her menstrual periods then appeared to be ovarian. After suffering in this manner for about four or five years she noticed the expulsion of membranous casts of the uterus at the menstrual periods. During this time and for a year afterward she was regularly treated by her family physician, but without relief. She then consulted Dr. Barker for her general ill-health, but did not call his attention to her derangement of the menstrual function. She improved in her general condition under his care, but found no relief from the membranous menstruation. She consulted him again and called his attention to the uterine trouble, and he immediately placed her under treatment.

The constitutional remedies employed I do not know, but the local treatment consisted in dilatation of the cervical canal and the application of iodoform to the uterine cavity.

She continued to pass membrane for several months; then the trouble ceased, and has not returned. She now menstruates regularly and naturally, and has done so for over two years.

Several other cases might be added, some showing failure of treatment, and others where the patients were really made worse by being treated for inflammation of the uterus which was supposed to be the cause of the affection, but undoubtedly was not. Other cases might be given, also, in which recovery took place, and after several months or years the trouble returned, but they would add nothing to the views already expressed regarding the pathology and treatment of this affection.

CHAPTER XIV.

LACERATIONS OF THE CERVIX UTERI.

Regarding this subject Dr. Thomas Addis Emmet says: "Its importance can not be exaggerated, since one half of the ailments among those who have borne children are to be attributed to lacerations of the cervix."

This estimate of the frequency and consequences of laceration of the cervix uteri is quite sufficient to introduce the subject and secure for it special attention.

Sir James Y. Simpson pointed out the fact that lacerations of the cervix uteri frequently occurred, and Dr. Gardiner also described such lesions and their results; but to Dr. Emmet is due the credit of describing fully the pathology of lacerations of the cervix and their causative relations to many other uterine diseases. He also devised efficient surgical means for their relief. This is certainly the most brilliant of all Dr. Emmet's achievements.

The disturbing influences of this injury upon the sexual organs and the general health are usually marked, but depend to some extent upon the magnitude and location of the laceration. The first effect noticed is to retard recovery after confinement. The laceration exposes raw surfaces to the lochial discharges which, when these are decomposing and offensive, may give rise to septicæmia. Even where this does not occur the injury interrupts, more or less, the process of involution and produces all the troubles which usually follow therefrom.

There is more or less inflammatory action set up in the parts, and the efforts at healing the laceration develop much scar tissue and not unfrequently enlargement and hardening of the parts from areolar hyperplasia. The scar tissue thus formed and the sclerosed tissues beneath and around the scars are often tender and painful. All this proves to be a source of local irritation, and sometimes causes much general disturbance through reflex action. The inflammatory action which immediately follows the injury does not entirely subside when cicatrization is complete. The inflammation in the cervical mucous membrane lingers there, and hence old lacerations are generally accompanied with marked catarrh of the cervical membrane. This is kept up and often aggravated by the eversion or rolling outward of the divided walls of the cervix, which exposes the cervical mucous membrane to friction and the acid secretions of the vagina. Therefore, the cervical endometritis accompanying lacerations has no natural tendency to disappear. It is also rebellious to treatment, and finally, if it is subdued, it soon returns unless the original injury is repaired. In lacerations of long standing, and especially those that have been treated by caustics, the mucous follicles become closed and distended, assuming the form of small cysts. The presence of these distended cysts increases the size of the cervix and gives an irregular outline to the surfaces under which they are situated. By pressure they cause absorption of the tissues of the cervix, so that when they are punctured or ruptured and their contents are evacuated the cervix becomes diminished below the original size.

The several forms of laceration of the cervix uteri most frequently seen in practice are:

1. Lateral lacerations of one or both its walls.
2. Antero-posterior laceration; usually found in the posterior wall, but occasionally involving both.
3. Multiple lacerations, usually three in number, but occasionally more.
4. Incomplete lacerations, in which the solution of continuity extends from within outward through the mucous membrane and muscular walls of the cervix, but not through the mucous membrane of the vagina. This form of injury is generally bilateral, but occasionally the lacerations are multiple, involving the two walls laterally and the posterior and anterior walls also.

Sometimes two of these forms of injury are found together, as, for example, a complete bilateral laceration and an incomplete laceration of the anterior wall of the cervix.

The first, and by far the most common of these injuries, lateral laceration, presents several varieties. The bilateral laceration, in its typical form, divides the cervix into two equal parts, and extends up to the vaginal junction.

As seen at times, the laceration is superficial, extending not more than half way up to the vaginal junction; again, the laceration may extend on one side up above the vaginal junction, while on the other it is much less extensive. In other cases the bilateral laceration divides the cervix into two unequal parts, the anterior portion usually being the larger (Fig. 109).

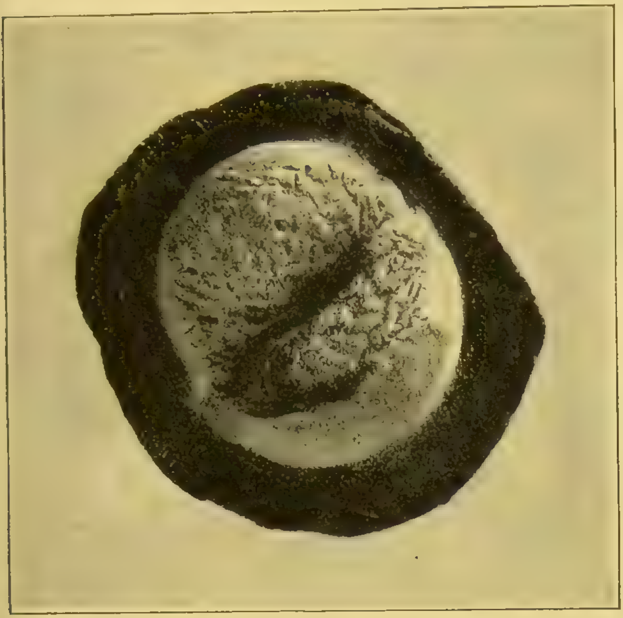


FIG. 109.—Bilateral laceration; unequal division of the cervix.

The morbid states of the cervix uteri which accompany this form of injury and are caused by it vary greatly. In the simplest forms the cervix, in the aggregate, is not much enlarged; the divided halves rest nearly together, and protect the mucous membrane of the cervical canal. Under these circumstances a slight hyperæmia of the cervical mucous membrane and a slight leucorrhœa are all the lesions present in many cases. Even these are not always found.

In other cases the halves of the cervix are widely separated. The mucous membrane of the canal is everted, and is generally denuded of its epithelium, markedly congested, often thickened and irregular, and covered with a profuse leucorrhœal discharge. In still other cases there is, in addition to the above eversion, a marked hyperplasia of all the tissues, especially on the inner surfaces. The new tissue fills in the space between the halves of the cervix, so that the opposite sides of the laceration can not be brought together (Fig. 110).

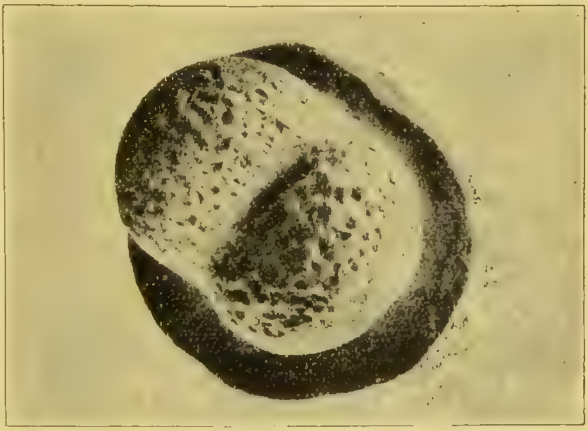


FIG. 110.—Bilateral laceration, with thickening of the everted lips.

This superabundant tissue is produced by arrest of involution and areolar hyperplasia. The tissue is denser than normal, and, in fact, presents a true sclerosis.

Lacerations of the antero-posterior walls, while they are said by Emmet to occur frequently, are comparatively less often seen, because they generally heal promptly and completely of their own accord. Where they are found, they are generally complicated with all the lesions described in connection with lateral injuries.

Multiple lacerations vary greatly in number and extent. A trilateral laceration is most frequently met with. The cervix is usually divided into three unequal parts, as seen in Fig. 111.

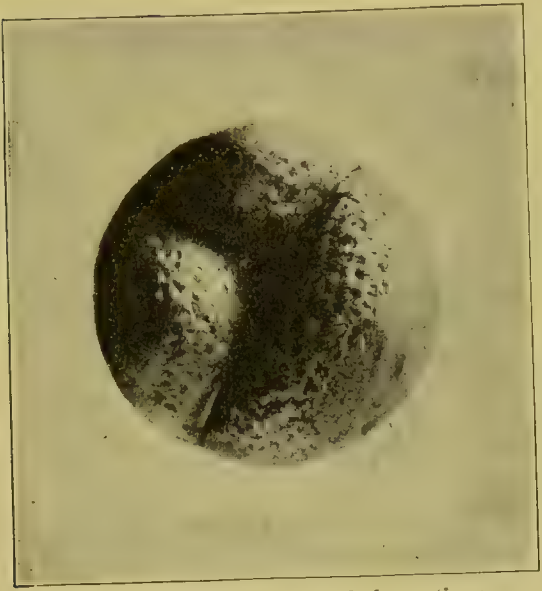


FIG. 111.—Extensive multiple lacerations.

This may be called a complete multiple laceration, because all the tissues of the cervix are divided. There is another form of this injury in which there are a number of lacerations which extend from within outward, but do not involve the vaginal mucous membrane (Fig. 112).

The lateral incomplete laceration may be unilateral or bilateral. Generally, both walls are divided from within outward to the outer mucous coat. This injury is overlooked quite often by gynecologists. At least, I infer this from the fact that Dr. Emmet is the only writer of all those whose works I have consulted who mentions it.

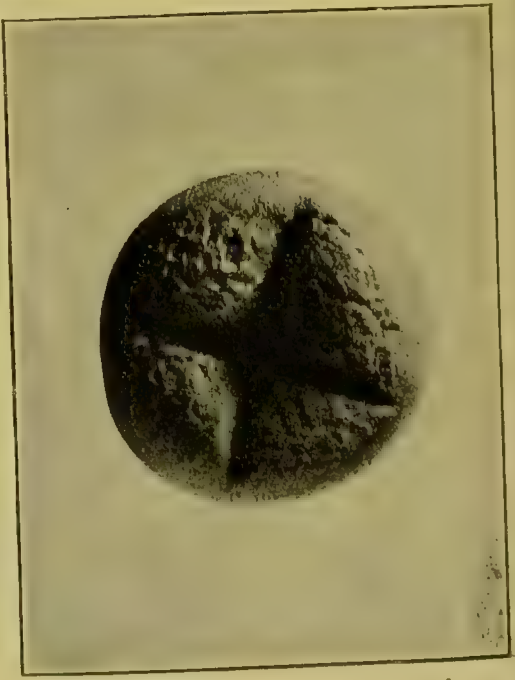


FIG. 112.—Multiple incomplete lacerations.

It is usually described as a patulous or dilated condition of the cervix, and to the touch and inspection it appears to be so, but a careful examination shows that the cervix is divided into two parts that are held together by the outer coat, or mucous membrane. Fig. 113 shows the lesion.

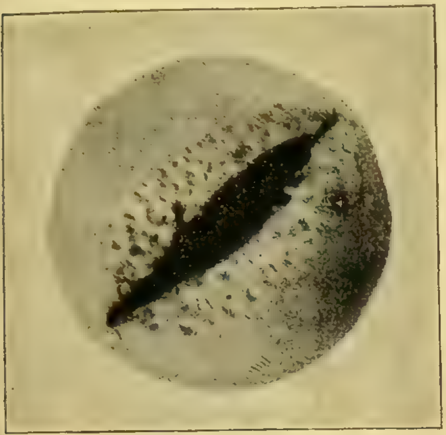


FIG. 113.—Incomplete bilateral laceration.

This lesion can be most conveniently demonstrated by passing the uterine sound into the cervical canal, and then carrying it outward in the line of the laceration, when it will become apparent that the outer coat of the cervical wall is all that remains intact. There is usually no eversion of the mucous membrane, but almost always there is a marked catarrh of this membrane, which is peculiarly resistant to treatment. In a number of these cases I have found enlargement of the anterior half of the cervix which gave a crescentic appearance to the os externum, Fig. 115.

Causation. — Laceration of the cervix is usually caused by parturition, either natural or instrumental. In a great majority of first labors the cervix is injured to some extent, but in many the laceration either unites or, being very superficial, gives no trouble and passes unnoticed. Certain conditions of the tissues of the cervix predispose to laceration. Irregular development of the cervix either before or during pregnancy, in which one wall is thicker than the other; induration from previous disease, which lessens the elasticity of the tissues; and a softened œdematous condition of the cervix, produced by pressure in tedious labors—all these favor laceration.

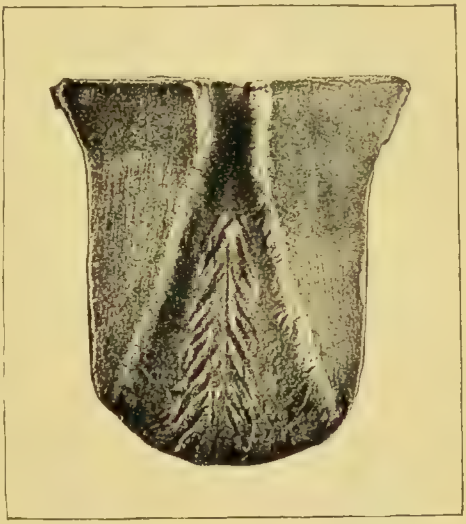


FIG. 114.—The incomplete bilateral laceration shown in Fig. 113, as seen by section of the cervix.

In abnormal labors requiring manual and instrumental aid before the cervix is dilated there is additional liability to injury, and this frequently occurs; but it is also a fact that lacerations often take place in perfectly easy and natural labors. Indeed, it appears that in easy and rapid labor lacerations are very likely to occur, such frequently showing that precipitate delivery is a cause of this accident. Dr. Emmet states in his book that he has seen laceration of the cervix in cases of criminal abortion. I have never seen laceration of the cervix after abortion from any cause at or before the third month of gestation. There is a condition of enlargement of the cervix with eversion of the mucous membrane of the cervical canal which presents all the physical signs of a superficial bilateral laceration, and this I have seen after abortion in the first pregnancy, but I have also seen the same condition in the virgin uterus. This affection is described under the head of cervical endometritis, and, therefore, need not be discussed here.

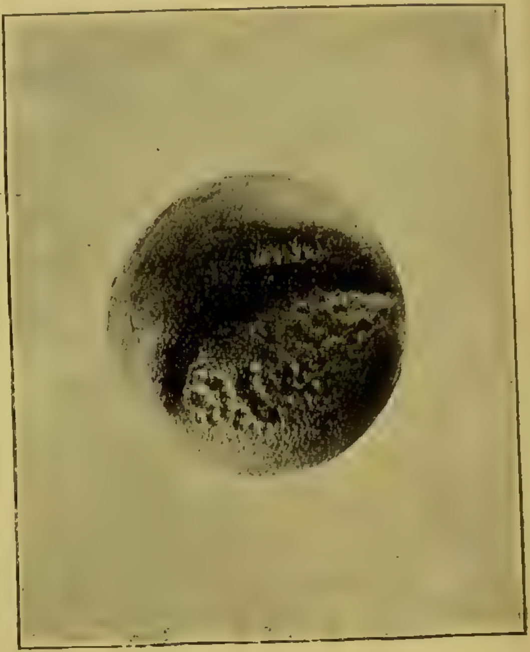


FIG. 115.—Crescentic laceration.

From what has been said, it will appear certain that this injury can not at all times be prevented by any skill and care on the part of the obstetrician. This should always be borne in mind and freely stated where the injury is attributed to carelessness on the part of the attendant during labor, a mistaken criticism not uncommonly heard among the laity.

The effect of this injury upon the uterus and the general health of the patient, together with the symptoms and physical signs, will be brought out in full in the histories ofi llustrative cases which follow.

The treatment of this injury includes the primary and secondary management. It has been suggested that when the injury takes place the laceration should be immediately closed with sutures, but this is impracticable. First, because it is impossible to fully estimate the extent of a laceration in the relaxed condition of the cervix immediately after delivery; and, secondly, the difficulty of accurately adjusting sutures under the circumstances would subject the patient to exposure, which is unwarranted. Besides this, the introduction of sutures and the disturbance of the tissues necessary to their introduction would tend to interfere with spontaneous union, a favorable termination not infrequently attained. The primary treatment then must be limited to the usual means employed by the competent obstetrician to secure normal involution of the pelvic organs. The secondary treatment should embrace three objects: First, to overcome the consequences of the injury; second, to improve the nutrition of the parts injured, and thus prepare them for the third step, the repair of the laceration by surgical means.

When an improvement in the condition of the tissues of the uterus is attained, the general health of the patient is usually benefited by securing the best conditions for success in the operation for restoring the laceration. In order to do this it is necessary to overcome as far as can be the endometritis which usually accompanies the injury. The means used for this purpose sometimes succeed in relieving the subinvolution which usually is present in those cases. Where there is much enlargement of the cervix from areolar hyperplasia, which makes it impossible to bring the divided edges together, and all ordinary treatment fails to reduce this enlargement, it is sometimes necessary as a preparatory measure to remove a portion of the tissue on the inner sides of the divided halves of the cervix and allow the parts to heal before performing the final operation. This I have usually accomplished by taking out a section on each inner side of the halves and bringing them together with a couple of sutures. These are left in place for a week or two, and in the mean time the hot-water douche should be used, and such local applications as may be necessary to relieve catarrh or hyperæmia. The sutures are then removed, and after a few weeks the operation for the restoration of the cervix is performed. When there are a number of cysts in the cervix (a condition known as cystic degeneration) they should all be opened and evacuated. Sometimes the everted mucous membrane becomes very much thickened, and presents a granular or papillomatous-looking surface. When such is the case, it is best to trim off the more prominent points on the surface, and subsequently make such application as will reduce the thickening and vascularity of the membrane.

It has been suggested by some that whenever there is a laceration it should be at once restored. Such authorities are of the opinion that if the operation is successful the other pathological lesions which were caused originally by it will disappear eventually. This is not by any means to be relied upon, and I much prefer to remove, as far as possible, all local complications before operating.

The objects to be obtained by the operation are to remove the scar tissue formed by the healing of the ununited edges of the laceration, and thereby relieve the pain and reflex disturbances which it may have given rise to, and also to close in the mucous membrane and protect it from further irritation. There is still another important benefit gained by the operation—viz., when the uterus is larger than normal, owing to subinvolution, a marked reduction in its size will follow after this operation. I believe that the completion of involution generally follows successful restoration of the cervix, excepting in those who have had puerperal metritis.

In recent superficial lacerations I have operated without anæsthetizing the patient. The pain of the operation is trivial compared with the distress from the after-effects of an anæsthetic. As a rule, however, it is necessary to administer an anæsthetic, especially in deep lacerations of long standing, where there is much scar tissue and consequent tenderness.

The operation for the restoration of the cervix uteri must vary a little in detail according to the nature of each form of injury, but the operation, as performed on the bilateral, uncomplicated form of laceration, illustrates in the most perfect way the mechanism and details of the operation. I will, therefore, describe the operation in this form of laceration, and give cases the histories of which will illustrate the necessary modifications in the other forms.

The operation is performed as follows: The patient is placed upon the left side, and a Sims's speculum introduced and held by a trained nurse or assistant. A tenaculum forceps, curved upon the flat side, is fixed in the anterior half of the cervix, at the point which makes the lip of the os externum. The posterior half of the cervix is seized in the same way with a similar forceps, and the operator, taking a forceps in each hand, brings the two flaps together, in order to see exactly where the parts are to be united. The forceps which holds the anterior flap is then given to an assistant, while the one attached to the posterior flap is held in the left hand of the operator, and the surfaces are denuded by the hawk-bill scissors, Fig. 116.

The points of the scissors are made to seize the angle formed by the junction of the two flaps as far up as appears necessary to denude them. The flaps are brought together by the aid of the forceps on

PLATE I.

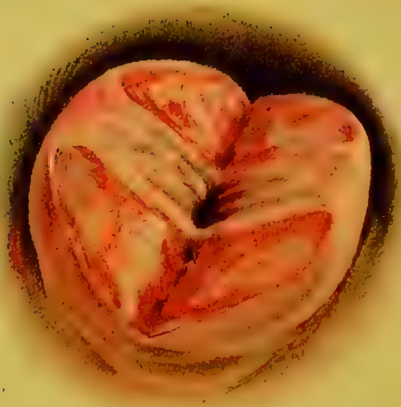


FIG. 117
PAGE 255.

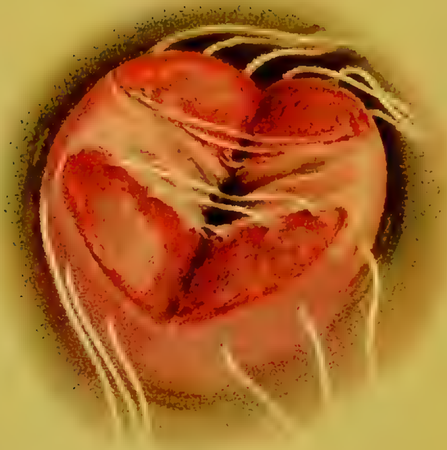


FIG. 120
PAGE 258.

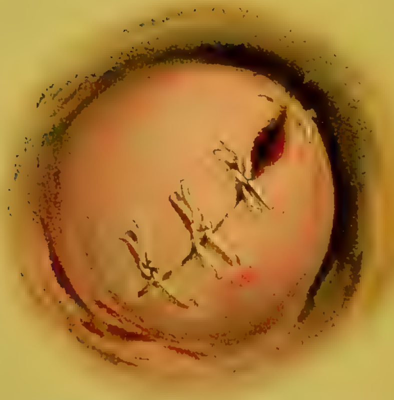


FIG. 121
PAGE 258.

PLATE I.

OPERATION FOR LACERATION OF THE CERVIX UTERI.

Figure 117. Page 255.

Denudation complete.

Figure 120. Page 258.

The sutures in position.

Figure 121. Page 258.

The sutures tied.

each side, so as to bring the tissues more within the grasp of the scissors.

The blades of the scissors are then closed, and a strip is removed from above downward on each flap. The other side is treated in the same way, and the most important part of the denudation is completed. It frequently happens that a portion of the tissue to be so removed escapes from the scissors at the lower portion of the flaps on one or both sides; but when this happens, the denudation is easily completed with the ordinary curved scissors. If the curved scissors only are used, much difficulty is experienced in vivifying the upper angles of the laceration, but with the hawk-bill scissors this portion of the operation can be accomplished accurately and with facility. The hawk-bill scissors, while saving time and trouble, give smoother surfaces for coaptation than can be otherwise obtained. A faithful trial of both methods by myself, and observations of the old method as practiced by the most expert surgeons convince me of this fact. It has been said that all the cicatricial tissue can not be removed with the hawk-bill scissors. In regard to that, I can say that I have always succeeded in removing all that was necessary to secure good union and satisfactory ultimate results. Fig. 117, colored plate, shows the two denuded surfaces on each side of the laceration and the strip of the mucous membrane between. The needles used are triangular and pointed. Three lengths are convenient to have, but the medium one can be made to answer for all. The shape and length of these are shown in Fig. 118.

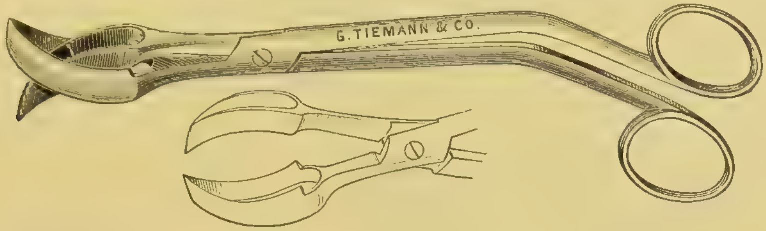


FIG. 116.—Hawk-bill scissors.

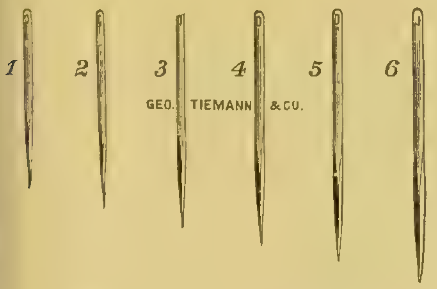


FIG. 118.—Triangular needles.

The needle-forceps described in connection with the operation for restoration of the pelvic floor is used for this operation.

The sutures are introduced in the following manner: The needle is placed in that groove of the needle-forceps which will give the desired angle, and is held immovable there, while the operator grasps the handle and closes the catch. The needle is then passed into the tissue, and left there while the forceps is unclasped and reversed. Its other end is then used to grasp the point of the needle and draw it through. The first two sutures are introduced at the lower end of the flaps, at points corresponding to the sides of the os internum. In some cases, when the parts do not come together easily, it is well to introduce first a suture on each side at the upper end of the wound, and then the two lower ones. While introducing the first two sutures the parts are held by the tenaculum forceps, which were used during denudation. As each suture is introduced, the ends are united by passing one around the other in a loop-knot. This keeps the sutures from being tangled.

The tenaculum forceps is then removed, and, while an assistant steadies the cervix by holding the ends of the first sutures, the others are introduced, a tenaculum being used to make counter-pressure while the needle is passed.

The sutures are tied as follows: One or two turns of the ends are made to form the first half of the knot, the assistant takes hold of one end, the other is passed through the loop of a counter-pressure instrument, and then seized by the left hand of the operator. Traction is then made on both ends of the suture, and, at the same time, the loop of the instrument is pushed down along the thread to make the knot slip to its destination. Repeating this manœuvre completes the knot. The instrument used is about the size and shape of an ordinary Sims's tenaculum, but, in place of having a hook-point, it terminates in a ring (Fig. 119).

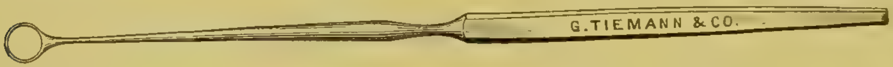


FIG. 119.—Ring-tenaculum or counter-pressure instrument.

By this method the sutures can be tied about as easily and rapidly in the cavity of the vagina as upon a free surface. The ends of the sutures are then cut off, and a small tampon of well-dressed flax, saturated with pine tar (marine lint), is carefully packed in, first around the cervix, and then below it. This tampon makes a good antiseptic dressing. It promptly absorbs serous oozing, and prevents any motion of the uterus which might strain the sutures. At the end of forty-eight hours it should be removed, and, if the parts are then in a healthy condition, no further local treatment is required. If there is any suppuration, a fresh tampon should be introduced, and allowed to remain for forty-eight hours longer.

From my experience in a large number of cases, I am satisfied that the use of the tampon is a reliable after treatment in this operation, and is preferable to the daily injection of carbolized water, which so many employ.

The patient should rest in bed, with the privilege of turning upon either side. The bowels and bladder should be evacuated upon the bed-pan.

The sutures should be removed upon the eighth or ninth day. If union is imperfect, the lower ones may be left in for two weeks.

The simplicity of the after treatment is its chief merit. Keeping the patient perfectly still in bed is a great punishment to one in good general health, and tends to prevent union; hence, giving the patient the privilege of tossing about on the bed is a great comfort. I am inclined to think that I could give the patient liberty to get out of bed to evacuate the bowels and urinate, if the tampon was employed continuously. As bearing on this point I may refer to the case that I operated upon in my office, and sent home in the street-cars. She made a perfect recovery. Another case shows what can be done with impunity. A patient of Dr. George W. Baker's, a very strong, active lady, was operated upon for a bilateral laceration in the usual way. She refused to stay in bed, but rested on the sofa, and visited the water-closet when necessary. Her menses came on prematurely and profusely. A large coagulum formed in the vagina and was passed while straining in the water-closet. Not the slightest hope of success was entertained, but on removing the sutures the results were found satisfactory in every way. These cases convinced me that the absolute quietude usually insisted upon is not necessary, and hence since then I have given more liberty of action. Much discomfort is avoided in this way, and the patient gets up better and stronger.

ILLUSTRATIVE CASES.

Typical Case of Bilateral Uncomplicated Laceration of the Cervix Uteri.—The patient was twenty-four years of age, and had her first child fourteen months before she was first examined. Her general health was fairly good, but she had backache and profuse leucorrhœa. Walking or standing gave her pelvic tenesmus, and she was more easily fatigued than in former years. She began to menstruate ten months after her confinement, and gave up nursing her child when it was a year old. The menses were normal, but more free than formerly, and lasted a day longer. She was sterile. Physical examination showed that the uterus was a little larger than it usually is in a person of her size. The cervical mucous membrane was hyperæmic, and denuded of epithelium in certain places. There was a profuse leucorrhœa.

The cervical canal was cleared of the leucorrhœal discharge, and an application of equal parts of tincture of iodine and carbolic acid was made. This was repeated at the end of a week and after the succeeding menstruation. The cervix was restored in the way already described without using an anæsthetic.

Figs. 120 and 121, colored plate, show the cervix with the sutures in position. A marine-lint tampon was used and kept in position for forty-eight hours. No after-treatment was needed. The sutures were removed on the tenth day, and the union was complete. The patient was kept in bed two weeks in all, and during that time was given a good, generous diet, and her bowels were moved daily. She had no pain during her rest in bed, and, although weak when she first tried to walk, she soon regained her strength. After the removal of the sutures a vaginal douche of borax and water was used up to the time of the next menstrual period. Three months after the operation she was free from all her former symptoms. The cervix then appeared like that of an imparous uterus.

Bilateral Laceration complicated with Enlargement of the Cervix from Hyperplasia.—This patient had her only child when she was twenty-six years old. Her labor was tedious, but otherwise normal. From the time of her confinement until I first saw her, four years afterward, she had not been well. She suffered from backache, pelvic tenesmus, and profuse leucorrhœa. Her general health, which was formerly very good, became impaired. The appearance of the cervix when first seen is shown by Fig. 110.

It was impossible to bring together the edges of the os externum, owing to the enlargement of the halves of the cervix. Constitutional treatment was employed, and the hot-water douche and tincture of iodine used locally, but at the end of two months there was only a slight improvement in the condition of the cervix. A preliminary operation was then performed as follows: A crescentic-shaped piece of tissue was removed from the inner side of each half of the cervix sufficiently deep to permit the halves to be brought together with very little traction. Fig. 122 shows the portions removed; the dark lines indicate the lines of incision. Two sutures, one on each side of the os externum, were introduced to hold the parts together while healing was going on. Figs. 123 and 124 show the parts brought together with the sutures, and Figs. 125 and 126 show a different method of doing the same operation. Before tying the sutures a piece of muslin saturated with wax was placed between the halves of the cervix, and left there for four days to keep the coaptated parts from meeting. The sutures were removed at the end of two weeks, when it was found that the parts where the exsections were made had nearly healed over. Three weeks afterward the cervix was restored in the usual way, and good union was obtained, and the patient subsequently recovered.

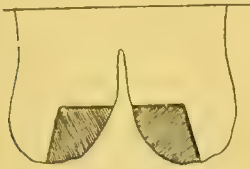


FIG. 122.

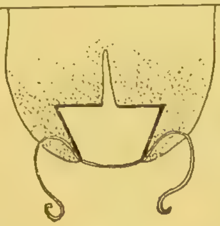


FIG. 123.

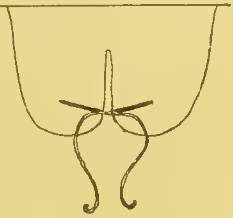


FIG. 124.

FIG. 122.—Removal of crescentic shaped piece (seen in section) when the everted lips are thickened. FIGS. 123 and 124.—Method of bringing the sides of the sections together.

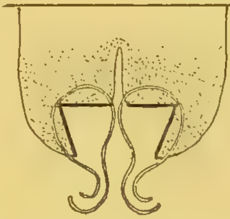


FIG. 125.

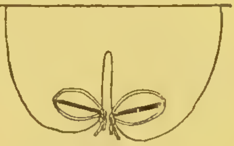


FIG. 126.

FIGS. 125 and 126.—Another method of closing the gap.

In cases like this I have sometimes removed the redundant tissue of the cervix at the time of performing the final operation for the restoration of the cervix. When this is done, it is necessary to keep a plug in the cervical canal during the healing process in order to prevent the vivified portions from uniting.

I much prefer to do the preliminary operation, believing that I can get better results by so doing.

Laceration of the Posterior Wall of the Cervix Uteri, complicated with Enlargement of the Cervix and Cystic Degeneration of the Mucous Membrane.—The patient was first seen when thirty-four years of age, and had been married thirteen years. The injury of the cervix occurred twelve years before, when she had her only child. She got up from her confinement with leucorrhœa, backache, and pelvic tenesmus, and continued to suffer from these for about one year, when, becoming tired of being told that her pelvic symptoms would disappear when she gained her strength, she consulted another physician. Local treatment was then employed with benefit, but it proved to be temporary. The leucorrhœa and other symptoms returned in an aggravated form. She continued in this way, getting a little temporary relief from treatment and again going uncared for.

up to the time that she came under my care. For three months she was treated for cystic degeneration, catarrh, and hypertrophy of the cervix. The latter appeared to be due to imperfect involution and hyperplasia combined. The laceration extended up to the vaginal junction, and there were erosion and eversion, but not to any great extent. In restoring the cervix, its sides were seized with the tenaculum forceps, and the upper angle of the laceration vivified with the hawk-bill scissors. The denudation was carried downward to the os externum with the curved scissors. The introduction of the sutures and the after-treatment were conducted as usual. The union was satisfactory in every way. There was no return of the former symptoms, and she was classed among the successful cases, although she remained sterile without any apparent cause for it.

Multiple Laceration of the Cervix.—A large, muscular lady had her first child when she was twenty-six years old. Her labor was tedious, the membranes rupturing before the cervix was fully dilated. Manual dilatation was resorted to, and the forceps used to deliver before the head had fully descended into the pelvis. This much of the history was obtained from the physician who attended her in confinement. Four years subsequently I first examined her and found a multiple laceration of the cervix. The irregular nodulated state of the cervix and its density to the touch suggested the thought that there might be malignant disease present. This suspicion was still further aroused by a speculum examination, which revealed a profuse leucorrhœa and a rough, vascular, papillomatous state of the mucous membrane. The fact that the parts improved promptly on treatment settled the diagnosis. The cervix was divided into three unequal parts (Fig. 112). For two months she was treated for the inflammation of the cervix, and at the end of that time the laceration of the posterior wall was operated upon in the usual way. It was not necessary to anæsthetize the patient, as the operation required only a short time and was not very painful. She was kept in bed for a week, and good union was obtained. This left the patient with a simple bilateral laceration, which was successfully operated upon five weeks afterward.

Multiple Laceration incomplete, complicated with Endometritis Polyposa.—The patient was thirty-seven years old, married seventeen years, and had borne three children, the youngest of whom was two years of age. It was impossible to ascertain when the cervix was injured. The history showed that her health began to fail after the birth of her second child, and that she broke down completely after her third one was born. When she came under my observation she had menorrhagia, a poor appetite, and constipation. She was emaciated, very anæmic, irritable, sleepless, and suffered much from headaches—in short, was perfectly useless, and a great sufferer. She had free leucorrhœa, backache, and ovarian pain, which was at times quite annoying.

The physical signs indicated that there was a polypoid state of the endometrium. There were four lacerations of the cervix. Two lateral, the largest, and one in the anterior wall and another in the posterior wall. These latter might be called fissures. They did not extend through the whole of the middle coat of the cervix. The lateral lacerations were complete, involving the entire wall of the cervix for about a quarter of an inch below and were incomplete above. The fungosities of the endometrium were removed with the curette. This relieved the menorrhagia and improved the general health of the patient to some extent. The restoration of the cervix was effected by operating upon the lateral lacerations in the prescribed way, i. e., first making complete lacerations of them, and then vivifying the parts and closing them with sutures. The antero-posterior lacerations or fissures were treated by vivifying their sides as well as could be done before closing the lateral ones. When the sutures were tightened in the lateral lacerations it was found that the traction appeared to hold the antero-posterior lacerations together. The result proved that such was the case. There was good union, and the patient gained in strength rapidly and was quite well at the end of three months.

Typical Case of Bilateral Incomplete Laceration of the Cervix Uteri.—The patient, a lady of excellent physique, married at thirty-one years of age, and had her first child three years later. Her labor was tedious in the first stage, but her recovery was without any marked interruption. When her child was twenty months old she became pregnant again, and miscarried at the third month. Six months after her miscarriage she was first examined. She then suffered from menorrhagia, pelvic tenesmus, and profuse leucorrhœa, which caused some general depression—but not to any great extent. The uterus was retroverted, and the cervical canal admitted the index-finger nearly to the internal os. The uterus was a little larger than normal, and its mucous membrane congested and irregular to the touch of the sound.

The uterus was restored to its position and retained there with a pessary. The canal of the cervix was touched with tincture of iodine. This gave her relief from tenesmus, but did not control the menorrhagia nor the leucorrhœa. Subsequently the cavity of the uterus was curetted, and carbolic acid and iodine were applied to the canal of the cervix. From this time on the menses were normal, but the leucorrhœa returned again and again. Treatment would arrest it for a time, but it returned, and she proved to be sterile. Restoration of the cervix was proposed in the hope that the operation would give her permanent relief.

The operation was performed as follows: Taking hold of the anterior and posterior walls of the cervix with the tenaculum forceps, a straight scissors was passed into the cervix half its entire length, and the mucous membrane of the vagina (the portion of the cervical wall which escaped laceration) was divided. The other side was treated in the same way. The halves of the cervix were drawn apart, so that the extent of the internal laceration could be clearly seen, and then the angle on each side was vivified with the hawk-bill scissors. After this there still remained a little redundant vaginal mucous membrane at the lower portion of the cervix, and between the vaginal and cervical mucous membrane the site of the laceration, the muscular walls remained modified. The redundant vaginal membrane was removed and the middle walls of the cervix were vivified with the curved scissors. This modification of the method of vivifying the parts to be united became necessary because of the lacerations being incomplete.

In some cases of incomplete laceration when the cervix is large, it is best to divide the vaginal mucous membrane first. By using the hawk-bill scissors a V-shaped piece can be taken out on each side which completes the vivifying with a single clip of the scissors on each side.

The sutures were introduced and the operation completed in the usual way. The case progressed favorably, union was complete, and there has been no return of the leucorrhœa nor any of her former symptoms.

Incomplete Laceration with Hypertrophy of the Anterior Half of the Cervix.—The patient had suffered from a profuse leucorrhœa since the birth of her child five years before. She had been treated occasionally, and derived only temporary relief, the symptoms returning again when treatment was suspended. The enlargement of the anterior half of the cervix was confined mostly to the mucous membrane. This gave a crescentic appearance to the os externum (Fig. 115). The treatment consisted of exsection of the hypertrophied portion of the mucous membrane in the anterior wall, and when the parts had healed the laceration was operated on in the same manner as in the case of incomplete laceration preceding this one.

The exsection was made by seizing the part to be removed with a tissue forceps, and with a slightly-curved scissors, clipping off the whole of the mucous membrane on that side up as high as the hypertrophy extended. There was some bleeding, but that was very easily controlled by packing the cervical canal with cotton, and using a vaginal tampon to keep it there.

The Results of the Surgical Treatment of Lacerations of the Cervix Uteri.—There are some points that remain to be settled by reliable observations regarding the results of the surgical treatment of these injuries. More statistics by reliable observers are needed to determine definitely all the benefits which may be reasonably expected from this form of treatment.

It may be fairly claimed that successful restoration of the cervix will relieve the inflammatory troubles of the cervix, including the suffering from scar tissue in the great majority of cases.

Sterility due to the injury of the cervix and the consequent lesions is cured in many cases.

Labor is not, as a rule, retarded by the condition of the cervix after the operation. Nor does laceration necessarily occur again. I have been able to compare the dilatability of the cervix after trachelorraphy with that of lacerated cervix with scar tissue, and I have found that the results are greatly in favor of those patients in whom the cervix has been restored.

CHAPTER XV.

CICATRICES OF THE CERVIX UTERI AND VAGINA.

Cicatrices, the results or products of diseased action and injuries, are of pathological importance according to their size and location. They derange the conditions of health and comfort by the tender and painful character of scar tissue, and by its inelasticity, which interferes with the free motion of the pelvic organs. The slow, persistent contraction of this abnormal tissue, by which the adjacent normal parts are united, causes pain by making pressure on the terminal nerve-fibers. Tenderness, also a characteristic of scar tissue, is developed in the same way, or perhaps from the excessive irritability or imperfect protection of the nerves found in cicatrices. This tenderness is most marked in scars at or near the introitus vaginæ, and varies according to the age of the new tissue. When an uninterrupted cicatrix surrounds the cervical canal, the os externum, or the vagina at any point, stenosis is produced, and all the derangements consequent thereon, according to the partial or complete development of the stricture.

Causation.—The causes which lead to the formation of cicatrices are familiar to all, and require only to be named in order to recall them for present consideration: Injuries during parturition sufficient to cause sloughing or loss of tissue; lacerations which heal over without uniting the divided parts, or which are united by intervening new tissue; amputation of the vaginal portion of the cervix; exsection of a portion of the vagina, especially where healing takes place by granulation; destruction of the mucous membrane and subjacent structures by the free use of caustics, and extensive ulceration either simple or specific. These are the chief affections which give rise to the conditions now under consideration.

Symptomatology.—The principal symptom developed by cicatrices is pain, which is often intermittent or remittent, and is usually increased by exercise. When the scar involves the circumference of the cervix, and the caliber of the canal is reduced below the normal size, dysmenorrhœa occurs in some cases. When the vagina is extensively involved, the functions of the bladder and rectum are occasionally deranged so as to give rise to frequent and difficult urination and painful defecation. This is due, doubtless, to the tenderness of the scar tissue and diminished mobility of the parts. For the same reason, coition is painful, and in some marked cases impossible. It will be observed that the same derangement of the sexual function occurs in vaginitis, vaginismus, and in that rare neurotic affection in which there is extreme hyperæsthesia without any apparent change of structure or circulation to account for it. In short, any or all of the symptoms caused by cicatrices may arise from other pathological conditions, such as are found, for example, in convalescence from pelvic peritonitis or cellulitis. On that account the diagnosis must be based chiefly on the physical signs.

Physical Signs.—These I may briefly mention. They are the presence of abnormal tissue, which is usually tender, always indurated, less elastic than healthy parts, and sometimes lighter in color, and having a smooth surface. Cicatrices of the vagina are easily detected; those of the cervix are liable to be confounded with sclerosis and incipient malignant disease. The points of distinction are the increase of tissue and abnormal vascularity found in the latter.

Treatment.—Knowing the evils which cicatrices give rise to, the first duty of the practitioner is to guard against their formation. This can be accomplished to a great extent, I am sure, by observing certain lines of practice. Lacerations of the pelvic floor, occurring during natural or artificial delivery, should be immediately brought together by sutures, when it is possible to do so, in place of leaving them to heal as best they may, which is the usual practice. In many such cases the patient is anæsthetized when the injury is sustained, and, if the obstetrician has the requisite instruments at hand—as he ought to have—the operation of closing such wounds with sutures is practicable; if such wounds can be made to heal without the intervention of much new tissue, the cicatrices are very unimportant compared with the large scars which are sometimes formed where healing takes place by granulation.

In making these statements, I am aware that the ground taken may be questioned. In opposition to this practice, it may be said that such wounds often heal promptly without the aid of sutures, and even when sutures are employed there is no certainty that good union will take place. On the other hand, it can be fairly claimed that, if the edges of a lacerated wound are held together, the chances of their uniting are better than if left alone. Even should healing take place by granulation, the sutures, preventing the wide separation of the parts, will tend to lessen the size of the cicatrix. When there is so much to be gained by good union, and so much suffering entailed by bad, the use of sutures in such cases is surely good surgery.

The formation of troublesome cicatrices following the use of caustics may be prevented by carefully circumscribing the space to which they are applied, and by avoiding their use to an extent sufficient to cause destruction of the deeper structures of the mucous membrane. When it is necessary to apply a caustic—say nitric acid—to the os externum or cervical canal, a portion of the membrane should be left untouched if possible, so that the eschar, if one is formed, will not completely circumscribe the canal. By attention to these points cicatrices may be prevented, or, if they follow, they will be less troublesome in character.

In the treatment of cicatrices the chief indications are to relieve the pain and tenderness of the parts, prevent contractions, and, where deformities exist, to correct them. These requirements can be most promptly and perfectly fulfilled by removing the whole of the cicatrix and bringing together the normal tissues, and obtaining as near immediate union as possible. But this radical treatment is only called for in rare cases, and is not always practicable, owing to the size, depth, and unfavorable location of the cicatrix. Exsection should not be undertaken in any case unless the scar is movable on the subjacent tissue. It is necessary to wait until this mobility is established, which usually occurs sooner or later. When the scar can not be removed altogether, contraction should be guarded against by preventing it from shortening. In oblong cicatrices, contraction in width rarely gives trouble, while shortening causes deformity. This can often be prevented by dividing the scar at one or more points, and then putting the parts on the stretch by the tampon or pessary. The divided edges thus held apart are united by intervening new tissue, and the scar is lengthened, while the process of narrowing still continues. Sometimes the contractility of the normal tissues is sufficient to draw the divided edges of the scar apart, so that incising the scar is all that is necessary.

When a cicatrix surrounds the os externum it should be divided on two sides, the lateral being preferable in most cases; a tent of sea-tangle should then be introduced and worn during the process of healing. The tent should be short, so as not to enter the internal os, and it can be held in position by a pessary by stitching it to the walls of the cervix. The frequent use of the sound or dilator will answer the same purpose.

In the management of cicatrices of the vagina, very satisfactory results are obtained by the treatment proposed. After dividing the cicatrix, the parts are put upon the stretch by the glass dilator employed by Sims and others in the treatment of atresia vaginæ. I have also used for the same purpose elm-bark, made into a roll of the proper length and thickness and beaten until it is soft. It is then dipped in carbolized water and introduced like a pessary. This has the advantage of being agreeable to the tissues, and by expanding very slowly it causes distention, which is easily borne. By enlarging from day to day the size used, the vagina can be distended slowly and without pain. I am satisfied that this method of treatment has another advantage, which is, that by slow, continuous dilatation the normal portions of the vagina can be developed so as to compensate for the contraction of the cicatrix to a very considerable extent.

When there is no marked deformity, and pain and tenderness are the only symptoms, great relief will often follow an incision of the cicatrix at a number of points. I have also been led to believe that softening of the scar and relief from pain were obtained by the frequent application of equal parts of tincture of opium, aconite, and iodine.

A word might be said about complications, such as vaginitis, cervical endometritis, etc. They are to be treated in the usual way, of course. I need only add that, so far as my observations have extended, it has been found that by relieving trouble caused by cicatrices, recovery from accompanying affections is facilitated. This is as might be expected.

ILLUSTRATIVE CASES.

Scar Tissue producing Stenosis of the Vagina. Primary Cause: Acute Inflammation during the Course of the Fever.—A lady, thirty years of age, large, well formed, and in general good health, menstruated first at fifteen years of age, and has continued to do so regularly and normally ever since. She has been married twelve years, and during that time coition has been impossible. Before marriage she had no symptoms of uterine disease, but soon after she developed uterine and vaginal leucorrhœa, which have continued intermittently ever since. She has also suffered occasionally from backache and irregular pains in the pelvis. Examination by the touch revealed contraction of the whole vagina, so that the index-finger could with difficulty be introduced, and at the upper portion there was a stricture through which the finger could not be passed. In a pocket beyond the stricture the cervix uteri was subsequently found. The stricture was due to scar tissue, which formed a circular band about a quarter of an inch wide. From this ring, extending downward, there was another cicatrix which terminated at the remains of the hymen. There was subacute vaginitis, and the papillæ of the mucous membrane were enlarged and exceedingly tender. The examination caused intolerable pain. At another time an anæsthetic was given and the stricture divided. The uterus was then found to be normal in size and shape, but there was a little erosion about the os externum, and congestion of the cervical mucous membrane and hypersecretion.

Nothing in the history of the case, nor in the local lesions, gave any clew to the cause of the trouble, but on re-examination it was found that when the patient was a child she had what was called typho-malarial fever followed by pelvic inflammation and the formation of abscesses.

From this much of the history obtained from the patient's mother, I presumed that the cicatrices of the vagina were the products of the disease of her childhood.

The treatment employed in this case was such as has been described, and marked improvement has followed. At the end of four months after beginning the treatment the vagina admitted Cusco's speculum; the tenderness was reduced, but not wholly relieved. The patient went to the country for the summer, to return in October for further treatment, and finally recovered.

Scar in the Vaginal Wall resulting from an Injury sustained during Labor.—I was called to see a lady two months after her confinement with her first child. I learned that she had had a tedious labor and was delivered by forceps. She made a good recovery, except that when she undertook to stand or walk she suffered from sharp pains in the vagina and a feeling of dragging and weight, especially on the left side.

On examination I found a recent cicatrix on the left side extending from the lower portion of the labium majus up the vagina for about three inches. The scar, which was about half an inch in width, was quite tender to the touch, and in the center of it, here and there, a few granulations remained and bled on being roughly touched. The patient, although very healthy and strong, had not been able to go up or down stairs or leave the house for two months after her confinement, the time when I saw her. No other uterine or pelvic disease could be found.

This case shows the trouble which wounds of the vagina, sustained during confinement, will cause, and it is reasonable to suppose that if the parts had been united by sutures at the time of injury a more prompt recovery would have followed.

Scar Tissue between the Posterior Wall of the Cervix Uteri and Vagina, caused by Former Treatment.—This lady was fifty years old, and had passed the menopause several years. Her health had been very good during most of her life. She had some uterine inflammation and leucorrhœa after the birth of her last child, and was treated with caustic applications which relieved the leucorrhœa. After this she began to have pelvic pain of a neuralgic character, which increased gradually. This pain was greatly aggravated by exercise. The effect of the local suffering and inability to take active exercise upon her nervous system was very marked.

A vaginal examination by the touch detected a thin band of scar tissue extending from the posterior wall of the cervix to the vaginal wall. The scar was quite tender, and when touched with the probe or finger gave rise to the neuralgic pain from which she generally suffered. The patient was placed on the side, and a Sims's speculum introduced. The cervix was caught with a tenaculum and drawn forward. This put the scar tissue on the stretch and made it prominent. The whole scar tissue was removed with one sweep of the curved scissors, and the edges of the mucous membrane of the vagina were united with a few catgut sutures. The parts healed without delay, and all the local pain and general disturbances promptly subsided. The relief was so prompt, complete, and permanent, that there can be no doubt about the scar tissue being the whole cause of the patient's suffering.

This case is a fair sample of a class, now fortunately diminishing in number, in whom scars are produced by the use of caustics. The general practitioner using a Ferguson speculum and a swab in treating diseases of the cervix uteri, usually does very little to cure the disease, but much to destroy the tissue of the cervix and vagina. The swab, charged with a strong caustic solution and pushed up into the canal, is compressed so that the caustic runs down on the posterior wall of the cervix and vagina. While the diseased tissues get very little of the application, the normal tissues at that point are destroyed. This is often repeated, and results in forming scar tissue such as that presented in this case. Such results of treatment were often seen years ago, and at the present day they are far too common.

A Band of Scar Tissue just within the Introitus Vaginæ, and extending across from Side to Side of the Vagina, due to Forceps Delivery.—The patient was undersized, but a strong, healthy lady. She was confined with her first child five months before I saw her. Her physician told me that the child was large in proportion to the mother, and that he was obliged to deliver with forceps while the head was high in the pelvis. In the delivery much damage was done to the cervix and vagina, but the pelvic floor was not torn. She recovered slowly from her labor, and continued to have a discharge, and pain mostly of a neuralgic character.

I found a semicircular band of scar tissue running from the ramus of the pubes, high up and around the vagina to the opposite side. The scar was unyielding, so that the finger could only be introduced with difficulty into the vagina. It extended deep down below the mucous membrane of the vagina, and at the upper ends was fixed to the pubic bones. It appeared to me that in the original injury the whole of the vaginal wall, together with the bulbo-cavernosus muscles and the anterior fibers of the levator-ani muscle, had been torn away from its attachments to the floor of the pelvis.

I have never before nor since seen an injury exactly like this, and hence I do not know positively how it was produced, but presume it occurred as I have stated. About half an inch from the median line of the posterior wall of the vagina the scar tissue was divided on each side. Traction backward was then made with a narrow-bladed Sims's speculum, which distended the vulva and at the same time brought the ends of the incisions, which were made parallel to the axis of the vagina, together. The sides of the incisions were held together with sutures. The immediate effect of this operation was to relieve, in a marked degree, the pains from which the patient had suffered. It also restored the dilatability of the vulva, so that the patient could resume her sexual duties when the incisions had healed.

CHAPTER XVI.

INVERSION OF THE UTERUS.

INVERSION may be defined as a turning inside out of the uterus, in which its walls descend into its cavity. The external surface becomes the internal, and the fundus uteri, which should be highest in the pelvis, becomes lowest. There are several degrees of inversion, varying from a mere depression of a portion of the uterus, to a complete inversion. In practice two degrees can be made out, and these can be easily comprehended by a reference to Figs. 127 and 128.

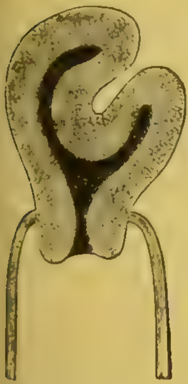


FIG. 127.—Partial inversion (Thomas).

In the first form there is a depression of one side or partial inversion; the second form is a complete inversion. When the vagina is also inverted, the condition is known as inversion and prolapsus.

This complication occurs as a rule in the puerperal state only. In all cases of inversion, at least at the time when this accident occurs, enlargement and relaxation of the tissues of the uterus are found. This is particularly so in the puerperal state, when inversion occurs most frequently.

Symptomatology.—The severity of the symptoms depends upon the extent of the inversion and the suddenness with which it occurs. Partial inversion, brought about gradually, may not cause sufficient disturbance to attract attention. The symptoms of shock are present when the inversion occurs suddenly, as it does in the puerperal state. The shock and pain are more marked, as a rule, when the inversion is accompanied with prolapsus. In a few recorded cases, the shock alone proved fatal. If there is great

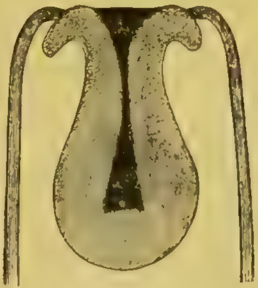


FIG. 128.—Complete inversion (Thomas).

hæmorrhage as well as shock, the patient is more likely to succumb.

Hæmorrhage occurs when the inversion is incomplete as well as when complete, especially at the time when the accident takes place. The presence of the uterus in the vagina causes disturbance of the bladder and rectum, by pressure.

These are the symptoms which occur in acute inversion, and if the patient passes safely through this stage then the symptoms of chronic inversion appear.

In complete inversion after the uterus has fully contracted, the hæmorrhage is not profuse, except at the menstrual periods, when there may be menorrhagia. This is generally a sero-sanguinolent discharge for the first week or even later, then the irritation may cause congestion, ulceration, and general inflammation of the vagina and mucous membrane of the uterus, and a consequent leucorrhœa and purulent discharge.

If the uterus remain outside of the vagina it usually becomes dry from exposure to the air, but it also becomes abraded in places and finally ulceration occurs. Whether the uterus remain in the vagina or becomes completely prolapsed, the inflammation, ulceration, hæmorrhage, and the purulent discharge which arise therefrom may break down the general health of the patient and the case terminate fatally.

Throughout all this there is pelvic pain and tenesmus.

Physical Signs.—The diagnosis (which is not by any means easy in all cases) depends largely upon the physical signs. These differ somewhat in recent cases and in those of long standing. When the inversion occurs after labor, the bimanual touch will reveal two very important facts. The uterus is not found in its position behind the pubes, but occupies the pelvic cavity, and can be outlined in the vagina. By moving the uterus between the two hands, the fundus and body will be found below in the true pelvis, while instead of the fundus being found above, a depression in the uterus can be felt at the superior strait. If the vaginal touch alone is relied upon, the condition will be taken for the coming placenta. The placenta being attached to the uterus, as it usually is at this time, obscures the uterus, but upon trying to remove it from the vagina by hooking down one of its edges with the finger, the solid uterus will be found above the placenta, the two being united, but easily separated. While this exploration and removal of the placenta—if it is present—are going on, the left hand is placed upon the abdomen, and the absence of the uterus above is observed, as already stated. Passing the finger above the mass in the vagina, in search of the walls of the cervix and the os uteri, a furrow is felt which shows that the walls of the vagina and uterus are continuous, and that there is no opening into the cavity of the uterus.

These signs will suffice for any one who is familiar with the normal condition of the parts in labor, to make a diagnosis. In fact, there are only two things which could easily be mistaken for inversion, a fibrous tumor and the presenting membranes in a case of twins. The latter could be made out by palpating the abdomen and finding the large uterus with the child, and the other, though less easily, could be detected by the presence of the uterus behind the pubes and the presence of the uterine canal which could be followed by the touch beyond the tumor.

These physical signs should be sufficient to suggest the diagnosis, which can be confirmed by restoring the inversion.

This is easily accomplished by any one familiar with obstetric manipulations. When there is complete prolapsus, as well as inversion, the diagnosis can be made by inspection. The form of the tumor, the appearance of its mucous membrane, the presence of the placenta, or, in case that it has been detached, the irregular appearance of the placental site compared with the rest of the membrane, and the contractions of the uterus, which can be noticed while handling the parts, are quite sufficient to settle the diagnosis.

In old cases, in which the uterus has become reduced to its original size by involution, the diagnosis is not so easy as in recent cases, and yet, by the aid of the sound and the bimanual touch, the diagnosis can be made with certainty in the great majority of cases.

By the touch the round tumor is found projecting into the vagina, and the lips of the os externum can be distinguished surrounding the tumor. The fornices can sometimes be made out also. In most of the cases that I have seen the cervix was thinned out so that its walls felt as if continuous with the vagina, and the fornices were also obliterated. In either condition the evidence is in favor of inversion, but when the cervix can be found the evidence is more valuable, especially if the finger can be passed up into the cervix between its walls and the body of the uterus. There the mucous membrane of the cervix can be felt reflected upon the tumor to the same extent all around.

These signs can be made out by the vaginal touch. The bimanual touch is still more satisfactory. By that method the uterus can be raised up in the pelvis by the finger or fingers of one hand in the vagina, while with the other hand a body with a depression in its center can be felt through the wall of the abdomen. In spare patients with relaxed abdominal muscles the bimanual touch will usually suffice to make the diagnosis quite positive.

In doubtful cases the uterus may be drawn down with a tenaculum or pressed down by a hand upon the abdomen, while a rectal examination with the index-finger of the other hand is made. In this way the fingers of the two hands may be made to meet above the uterus, and at the same time the finger in the rectum may detect the cup-shaped end of the uterus above. In case the bimanual touch is not practicable, owing to the patient being very stout, or the abdominal muscles unyielding, the same signs can be obtained by passing a sound into the bladder and turning it backward until it meets the finger in the rectum above the uterus.

To facilitate either or both of these methods of examination by the touch, the uterus may be drawn downward by a noose made of tape or rubber passed around the cervix, as recommended by Barnes.

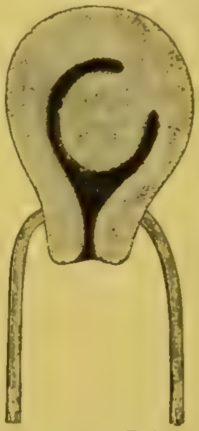


FIG. 129.—Polypus simulating partial inversion (Thomas).

Chronic inversion is likely to be mistaken for fibrous polypus of the uterus. A number of mistakes of this kind are on record, but most of them occurred before the time when the uterine sound and the bimanual touch were employed for diagnostic purposes. The differentiation can usually be made by the methods of examination already described.

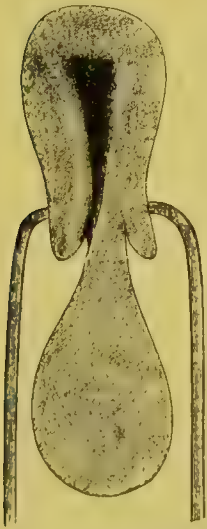


FIG. 130.—Polypus simulating complete inversion (Thomas).

In polypus, the uterine sound can be passed beyond the tumor into the uterus above, whereas, in inversion, the progress of the sound is arrested at the neck of the uterus. The bimanual touch, rectal touch, and vesico-rectal examination, reveal the uterus above the tumor. The inverted uterus is tender, the polypus is not. This sign is of much value. By seizing the tumor and turning it around it will move in the cervix if it is a polypus. The two surfaces will glide backward and forward upon each other, but in inversion no such motion can be produced. Incomplete inversion is not easily diagnosticated under the most favorable circumstances. To distinguish partial inversion from an intra-uterine fibroid of small size is next to impossible. Fortunately, such a diagnosis is not imperative, because active treatment is not often called for in these incomplete and doubtful cases.

Prognosis.—Inversion is always a grave condition. If it does not prove fatal at first from shock and hæmorrhage, it becomes a continuous trouble, which either gradually undermines the general health, and thereby shortens life, or else keeps the subject in a state of impaired usefulness and ill health. There is no certain tendency to natural recovery, and although quite a number of cases have been recorded in which spontaneous replacement of the uterus was said to have taken place, such an occurrence must be very rare. From the fact that most of these cases are recorded by the older authors, it is possible that in some of them the diagnosis was incorrect. One thing is certain, no such fortunate termination should be expected or relied upon. Without treatment the condition will probably continue.

The prognosis is rendered more grave by the fact that the treatment is not without danger.

There are several methods of treating inversion, but neither of them is wholly safe. This statement applies to chronic inversion. When the inversion occurs during labor, immediate replacement is easy and not attended with any great risk. The dangers in restoring an old inversion are from inflammation and septicæmia, produced by the injuries to the uterus, vagina, and adjoining parts during the violent efforts necessary to accomplish the object. These dangers are greatly increased by unskillful operating, still unfortunate results have occurred in the practice of the most skillful surgeons.

Causation.—The conditions which predispose to inversion are enlargement of the uterus and relaxation of its tissues. These are best illustrated in the puerperal state. Inversion can not take place in a normal non-puerperal uterus. The condition of the uterus immediately after the delivery of the child is most favorable to the accident, and it is at this time and under these circumstances that inversion most frequently occurs.

Predisposing causes, other than pregnancy or parturition, are known, but they are operative in bringing about a condition of enlargement of the uterus and relaxation of its tissues. These are distention of the uterus from tumors or fluids. The relaxation of tissues which is found in imperfect involution and prolapsus is also given as a predisposing cause, but I have not seen the record of any case which could be clearly traced to this cause.

To briefly restate this matter, the tendencies to inversion depend upon enlargement, distention, and relaxation. The exciting causes are traction or pressure upon the fundus uteri when it is in a condition favorable to inversion. The direct causes are traction upon the umbilical cord or pressure upon the fundus uteri at the moment when the child is expelled, or sudden delivery of the child, either by traction or the natural muscular efforts. Muscular efforts, when there is relaxation of the uterus, are mentioned as a cause, and cases are recorded in which inversion is said to have occurred in that way, but that cause must be seldom operative. Prolapsus uteri is also credited with having some causative relation to inversion, but I have no knowledge on this subject. Next to parturition come intra-uterine tumors in the causation of inversion. All the cases which have come directly under my own observation, or that have come to my knowledge indirectly through competent contemporary authorities, have been clearly traceable to parturition or fibrous polypi.

The conditions are alike in pregnancy and intra-uterine tumors, so far as the uterus is concerned in the predisposition to inversion. There is enlargement of the uterus with relaxation followed by muscular contraction. During the growth of the tumor the uterus increases in size, and finally endeavors to expel the growth, and when the muscular contractions are going on the fundus uteri is dragged downward by the pedicle of the tumor. In this way all the predisposing and mechanical conditions are present which are most competent to cause inversion.

Treatment.—There are several methods of managing inversion. Of course the indications are to restore the uterus to its proper relations. This is often difficult in chronic inversion, and sometimes impossible, hence other means must be employed to give all relief possible.

In case replacement can not be accomplished, the most prominent symptoms should be relieved by treatment; hæmorrhage should be controlled by astringents and inflammation should be reduced by appropriate care. Inversion can be successfully treated if seen immediately after it occurs. The method of operating is to grasp the uterus in the right hand, and carry it upward until the cervix can be felt with the left hand through the abdominal wall; counter-pressure is then made while the fundus uteri is being forced upward with the right hand in the vagina. The abdominal walls being thoroughly relaxed, as they are immediately after confinement, the bi-manual manipulations are comparatively easy. The os uteri can be felt with the left hand, and by pressing the abdominal wall down into it with the fingers it is dilated, and when the fundus is restored far enough to engage in the os, the lips of the cervix can be pushed over the fundus, in the same way that they are pushed over the head of the child in delivery.

Cases of Recent Inversion.—I have seen four cases of inversion soon after they occurred, one in my own practice and three in consultation.

Two of these were inversion with complete prolapsus, and the other two were uncomplicated. My own case was that of a strong young woman in her second confinement. The pelvic outlet was rather narrow, and the perinæum rigid, so that the pains which expelled the head were most powerful, especially the last one. The moment that the head passed the perinæum the whole child was expelled with extraordinary force. While the nurse rested her hand upon the abdomen I tied the cord, and then I found the placenta presenting at the vulva. I passed my finger up to bring the edge down and then deliver it, but I found a hard body above to which it was attached. I then passed my left hand over the abdomen, and found that the uterus was not there. Inversion was suspected, and I at once separated and removed the placenta, which was very easily done in this case, and then with bimanual manipulation restored the uterus with the greatest facility. The removal of the placenta and the reduction of the uterus occupied but a moment. The patient did not apparently suffer, but I think that there was slight shock and consequent anæsthesia, so that the reduction was painless and finished before she reacted.

I found I could grasp the fundus easily, and by making firm pressure upon one corner with my thumb and upon the other with the middle finger, and thus raising the whole uterus up until I could feel the os with the fingers of the left hand, the pressure and counter-pressure effected the reduction with ease and rapidity.

I found that the reduction of one horn first, as recommended by Dr. Noeggerath, answered well, first because the horn was more easily brought under pressure, and also because it appeared to yield most readily. In grasping the uterus the thumb naturally rests upon one horn, and by making firm pressure at that part, which is more convenient than to press upon the center of the fundus, it appears to be the natural way of effecting reduction by the unaided hand. The hand was made to follow up the reduction, so that when it was completed the hand was fully within the uterus, and it was left there, and pressure upon the uterus with the left hand upon the abdomen was made until the uterus contracted and the hand was expelled. This was the part of the procedure which required the most time, owing to the uterus being slow to contract.

The three other cases were seen in the practice of others. One that I saw with Dr. A. R. Matheson, was a complete prolapsus as well as inversion. I saw the patient in about half an hour after the inversion occurred. There was considerable shock, and the doctor was obliged to hold the uterus with the placenta attached in the firm grasp of both hands to prevent hæmorrhage. The prolapsus was reduced first and then the inversion, in the same way and in about the same time as the case just described. I saw another case of inversion and prolapsus with Dr. Bliss. It was of three days' standing. The doctor did not attend in confinement, but was called to see the patient because of the inversion. When I saw her she was exceedingly weak. The pulse 140, and feeble. She was anæmic, and the abdomen greatly distended and tender to the touch. The uterus was resting between the limbs, and parts of the mucous membrane here and there were in a sloughing condition, and other portions were dry and glazed looking. Vaseline was applied over the whole surface, and the uterus first pushed up into the vagina and then grasped with the hand, and the inversion reduced. The operation in this case was more difficult and prolonged. Owing to the tympanitic state of the abdomen it was difficult to make proper pressure upon the lips of the cervix, and that was a cause of delay. The extreme depression of the patient (while it raised a doubt as to her being able to stand the operation of reduction) gave that complete relaxation and general anæsthesia which was favorable. No anæsthetic was given. In about ten minutes the reduction was effected. The patient recovered.

One other case I saw with Dr. Bodkin. The inversion occurred at two o'clock, and three hours later it was reduced. There was some excitement of the pulse, and the patient had pelvic pain. There was very little hæmorrhage, but there had been considerable at the confinement. Chloroform was administered, and the reduction was accomplished by the same method. More time was required than in either of the other cases, because there was more contraction of the uterus, but by means of upward pressure and counter-pressure upon the lips of the cervix the reduction was accomplished in a short time.

Chronic inversion is far more difficult to manage than recent inversion. In fact, when the inversion has existed long enough to permit the uterus to regain its original size, or nearly so, by involution, and has contracted firmly, its reduction is always difficult, and sometimes impossible. This has led surgeons to devise several methods of reducing this inversion under these circumstances.

Dr. Thomas has classified these methods as follows: Methods of effecting gradual reduction and methods of effecting rapid reduction. The method of reduction by taxis is the oldest and most reliable, and should be tried first in all cases, because, if it fails, the gradual reduction may be tried subsequently, providing that the taxis is not so violent and prolonged as to cause fatal inflammation.

There are several ways of applying taxis, but only two ways of attaining the desired end. The principle of the one is to reduce first that portion which was last inverted, and the other is to reduce the fundus first and dilate the cervix at the same time, so that the portion first inverted is first reduced. To some extent both objects may be attained at the same time by so manipulating that both changes of position may go on together. The method of operating is as follows: The patient should be placed upon the operating table in the dorsal position, and the surgeon's hand carefully introduced into the vagina. It is necessary to dilate the vagina, in the great majority of cases, in order to admit the hand. Sometimes the dilatation is difficult to accomplish with the hand without rupturing the vagina. When this is the case, dilatation as a preliminary measure should be accomplished by stretching with the speculum and the inflatable rubber bag. The right hand is introduced into the vagina and the uterus grasped with the thumb and fingers. The uterus is compressed and at the same time carried upward, and held against the left hand, which makes the counter-pressure. The manipulations with the right hand should be so directed that one or both horns should be reduced first. The cervix should be dilated, and reduction begun at that point at the same time that reduction of the horn is effected. Fortunately, the efforts to accomplish the one favor the other.

This method of Noeggerath's, which has already been discussed, is that which I prefer, but there are certain modifications which are of value in certain cases, and should be employed when failure of the one method makes the trial of the modified methods necessary. For example, Dr. Thomas has employed a cone of wood in place of the left hand for dilating the cervix. In thin patients this can be inserted into the ring of the cervix, which can be felt through the abdominal walls, and gradually forced into the cervix until sufficient dilatation is obtained. Barren placed the fingers around the body of the uterus and the thumb upon the fundus, and forced the cervix against the sacrum to secure counter-pressure.

Courty's method consists in using the index and middle fingers of the left hand in the rectum, to dilate the cervix and make counter-pressure. This method of using the left hand combined with the method of Dr. Noeggerath is highly commended by Dr. T. G. Thomas. Dr. Emmet describes his method as follows: "In 1865 I succeeded in effecting a reduction by passing my hand into the vagina, and, with the fingers and thumb encircling the portion of the body close to the seat of inversion, the fundus was allowed to rest in the palm of the hand. This portion of the body was firmly grasped, pushed upward, and the fingers were then immediately separated to their utmost; at the same time the other hand was employed over the abdomen in the attempt to roll out the part forming the ring, by sliding the abdominal parietes over its edge. This manœuvre was repeated and continued. At length, as the transverse diameter of the uterine cervix and os was increased by lateral dilatation with the outspread fingers, the long diameter of the body became shortened, and the degree of inversion proportionately lessened. After the body had advanced well within the cervix, steady upward pressure upon the fundus was applied by the tips of all the fingers brought together."

This method, which appears to me like Vandel's, is natural in theory, but in trying it I have found that I could not separate the fingers to any extent, owing to the fact that the extensor muscles are feeble in their action, and not capable of doing more than resisting the pressure of the vagina.

Dr. Emmet also commends the closure of the cervix with silver sutures in cases where the reduction can not be completed. He gives a diagram representing the cervix as being about three times as long as the body, and drawn over the fundus and held there by sutures. I have never practiced this treatment for the reason that in all the cases in which I have been able to get the body and fundus reduced wholly within the cervix, the complete reduction has been easily and speedily accomplished. Again, I can not see how sutures of any kind would resist the pressure of a partially inverted uterus, with a strong tendency, which there always is, to become further inverted.

Repositors have been used to aid in the taxis by De Paul, Aveling, White, and others. The most useful of these, and one that fulfills the requirements is that invented by Dr. John Byrne, of Brooklyn. It consists of a cup and stem with a movable plug or button in its center. The button forms the bottom of the cup when it is placed over the uterus, and while the cup is in place the plug is pushed forward by the screw in the handle against the fundus, and in that way makes the required upward pressure.

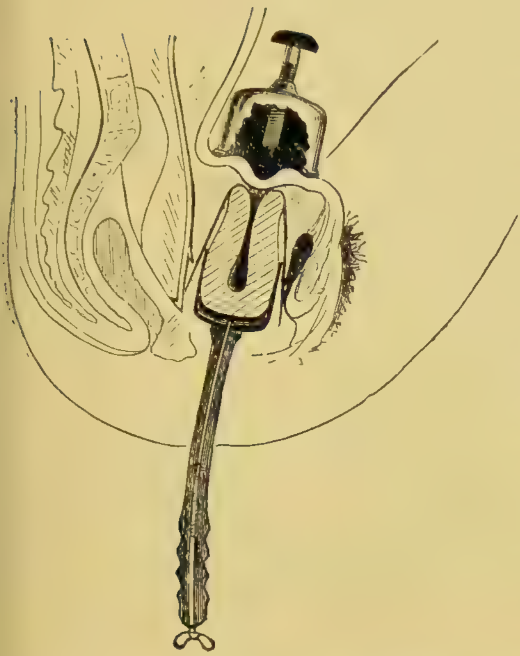


FIG. 131.—Byrne's method of reduction.

Fig. 131 shows Dr. Byrne's repositor as used, and its cup or bell-shaped instrument with the plug and screw adjustment for making counter-pressure and dilatation of the cervix. A piston in the lower cup pushes the fundus up. There are a number of adjustable cups which can be adapted to the requirements of different cases.

Cases are sometimes met which can not be restored by taxis. Resort must then be had to such means as gradual reduction by continuous pressure. This is effected by a cup and stem (Fig. 132) which are held in place by a perineal band of rubber or elastic fastened to a bandage applied around the pelvis. When using this instrument care must be taken to keep the uterus in the line of pressure. When the vagina is relaxed the uterus may fall backward or forward out of the line of pressure; this can be avoided by using a tampon around the uterus, which may be worn for two days if no great distress is caused by it. It should be examined from time to time, and if there is much

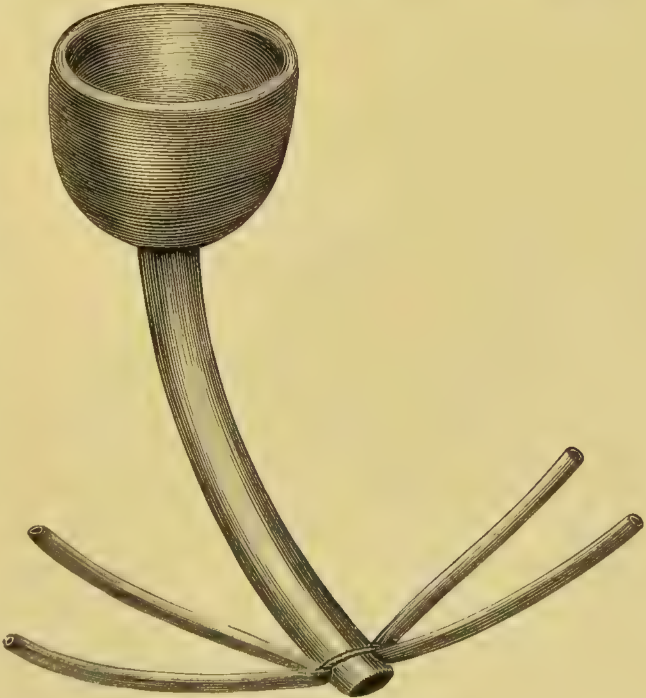


FIG. 132.—Cup pessary to exercise gradual pressure (Thomas)

irritation the instrument should be removed and vaginal injections used until relief is obtained, and the use of the instrument may be again resumed.

The rubber bag filled with water answers a very good purpose. To apply this, the patient should be placed in Sims's position, and through the speculum, the upper portion of the space between the uterus and vagina should be filled with prepared wool; then the bag should be introduced between the fundus uteri and the pelvic floor, and distended with water. A firm perineal band is then used to support the pelvic floor. Dr. Thomas recommends a strip of adhesive plaster for the perineal band, one end being fastened to the sacrum and the other to the abdomen, with two openings, one for the tube of the bag, and the other opposite the urethra to permit urination. I prefer the ordinary muslin or elastic band, because it is more easily removed and readjusted. The degree of pressure and the time which it should be continued must depend upon the results.

If there is much pain or irritation the treatment must be suspended. The combination of elastic pressure and taxis has been employed with advantage. After the pressure has been used for a time taxis should be tried, and in case this fails the elastic pressure should be again attempted. Care must be exercised in the use of taxis—it should not be too violent or long-continued; this must be decided by the operator in each case.

Dr. Charles Martin, of France, succeeded by using a stream of cold water projected against the fundus uteri, through the speculum. This he employed twice a day. The stream was thrown with considerable force; he also filled the speculum with cold water, and kept the uterus in it three or four minutes. Dr. T. G. Thomas, from whose work I take the above statement, approves of this method.

Dr. Thomas has devised another method, which I understand he employs or advises where other methods fail. The following is taken from his work on diseases of women: "Thomas's method consists in abdominal section over the cervical ring, dilatation with a steel instrument, made like a glove-stretcher, and reposition of the inverted uterus by any one of the methods mentioned, by the hand in the vagina. Fig. 133 will render this clear.

"This procedure, let it be remembered, is not offered as a method of treating inversion of the uterus, but as a substitute for amputation. Few cases will, I think, resist elastic pressure and judicious taxis; but that some will do so can not be questioned. It is to save these few cases from amputation that I suggest abdominal section.

"One of the cases operated on in this way has proved fatal. Let it not be forgotten that a certain number of these cases treated by elastic pressure and by taxis likewise do so, for, as in my second case, these operations are often performed upon exsanguinated women whose blood is impoverished. One instance of death after reduction by elastic pressure is recorded by Dr. Tait in the eleventh volume of the 'London Obstetrical Transactions,' while one of the earliest cases on record reduced by taxis—that of Dr. White, of Buffalo, likewise ended fatally."

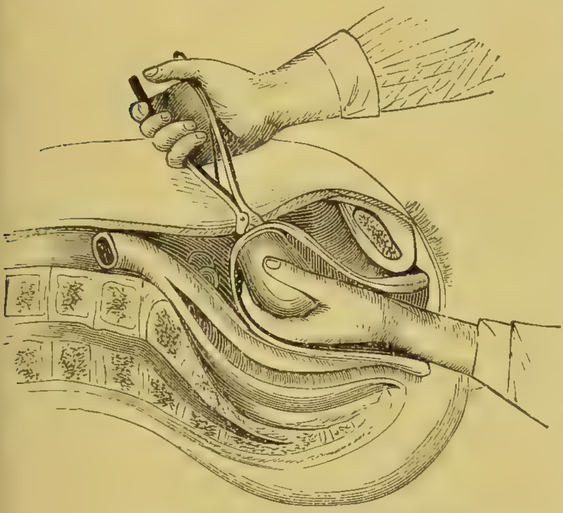


FIG. 133.—Replacement of uterus by dilatation through abdomen. (Thomas.)

One other method is worthy of mention, namely, that of Dr. Brown, of Baltimore. He makes a free incision in the fundus uteri, and through the opening thus made he stretches the cervix and then reduces by taxis. In case of failure of all efforts, hysterectomy may be performed. This, I consider advisable, if the patient is near to or past the menopause, but it should not be undertaken until all other methods have failed.

There are several methods of amputating the inverted uterus. Dr. McClintock applied a string ligature around the highest portion which strangulated the uterus, and in two or three days when decomposition of the tissues began, he amputated. Hegar accomplished the same object by passing strong sutures through the cervix, and after drawing them tight enough to close the vessels and close the peritoneal cavity, the body was amputated.

It will suffice to simply mention amputation without giving elaborate details. It was frequently practiced in the past, but is seldom heard of now. Other methods succeed, and with the method of Thomas in reserve—in case pressure and taxis fail—amputation will seldom, if ever be called for. Cases might be quoted to illustrate the treatment of chronic inversion, but they would add nothing of value to the methods of operating given above.

CHAPTER XVII.

DISLOCATIONS OF THE UTERUS.

The uterus is peculiarly subject to physiological changes of position. The bladder in front causes the uterus to move forward and backward according to its dilatations and contractions. In a similar but much less extensive way, distention of the rectum acts to push the uterus forward. The abdominal pressure from above is constantly changing, and is, therefore, constantly affecting the position of the uterus less or more. The movements of the uterus under the influence of the ever varying degrees of abdominal pressure are easily observed by watching the anterior vaginal wall and uterus through a Sims's speculum in the living subject. There is an up and down motion, very limited but constant, caused by ordinary respiration, and under extra exertion, such as coughing, the displacement becomes very marked.

Below there is the pelvic floor, which has least of all to do with changing the position of the uterus, and yet much to do in counteracting the inclinations to displacement produced by other influences.

These changes of position, when limited in degree, are physiological, the organ promptly returning to its original position as soon as the displacing influence is removed. It is only when the uterus remains displaced permanently or is carried far beyond the physiological limits that the dislocation is to be regarded as pathological. When this occurs, the malposition gives rise to suffering from deranged menstruation, circulation, and innervation, and in some cases to sterility. Usually, the functions of the bladder and rectum are disturbed and the general system suffers from reflex influences. It is only when such symptoms as these are present that displacements of the uterus claim the attention of the gynecologist.

In order to fully comprehend displacements of the uterus it is very necessary that the normal position of the uterus should be clearly understood, and this can only be attained by a knowledge of the anatomy of the pelvic organs.

Anatomy.—In discussing this subject attention will be chiefly directed to the position of the uterus in the pelvis, its relations to neighboring organs, and the position and character of the structures which keep it in position.

One would naturally turn to the cadaver in the hope that by careful dissection the exact position of the uterus could be determined, but after life is extinct the uterine supports lose their firmness, and changes of position usually take place. Moreover, it frequently happens that the pelvic organs are less or more displaced toward the end of life, so that a normal state of the parts is not often found in the cadaver. Dissection also tends to displacement, no matter how carefully it may be performed. To obviate this, sections of the frozen subject have been made, and much valuable information obtained from them. Still, the greater part of useful information on this subject must be obtained from careful and oft-repeated examinations of the living subject. With information obtained from all these sources there are still differences of opinion among authors on certain points.

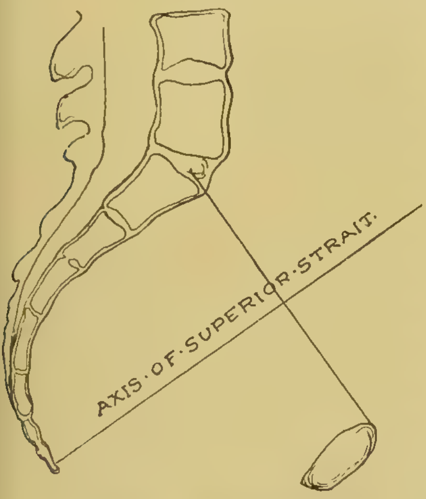


FIG. 134.—Section of pelvis, showing its inclination and the axis of the inlet.

Under the circumstances, in place of giving a number of conflicting opinions, it will be better to give the views which I have adopted as the result of my own observations on the living subject, and after a careful investigation of the views of others.

In the first place, it may be said that the uterus is wholly within the true pelvis.

The line on the diagram running between the symphysis pubis and the promontory of the sacrum divides the true pelvis from the abdomen, and all the pelvic organs, the uterus included, are below this plane, the superior strait, as the obstetricians call it (Fig. 64). The long diameter of the uterus in the pelvis corresponds very nearly to the axis of this plane, as represented by the line (Fig. 134), and it is equidistant from the sides of the pelvis.

The position of the uterus varies from time to time, as already stated, but in all its changes it returns to the axis of the inlet of the pelvis, slightly behind the center of the true conjugate. This is not mathematically correct, but is sufficiently so to form a basis from which further studies, both anatomical and clinical, may be conducted.

In order to obtain some idea of the position of the uterus and the influences which the other pelvic organs have in changing this position, reference should be made to Fig. 64, which shows a section of the normal pelvis. Fig. 135 shows the changes in the position of the uterus during the several degrees of distention of the bladder. These physiological changes should be noted and the causes which give rise to them, in order that they may be recognized clinically. Next in the order of inquiry are the anatomical structures by which the uterus is held in position. This requires a consideration of the

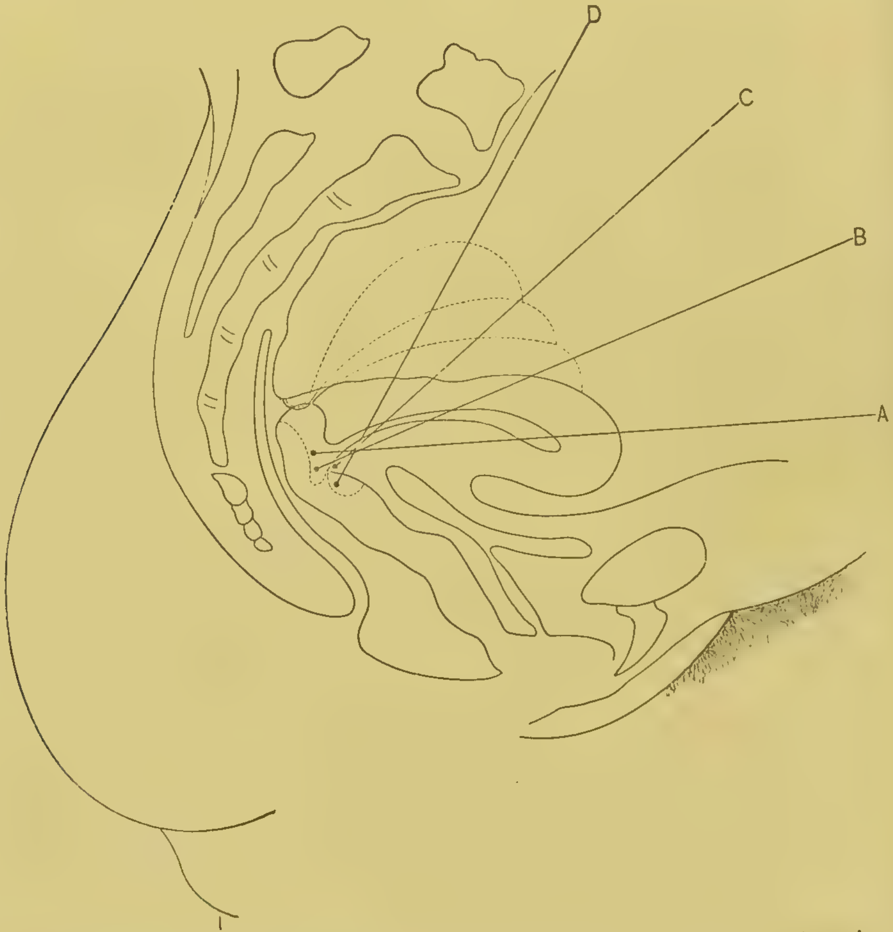


FIG. 135.—The normal range of the uterine axis, varying according to the distention of the bladder; A, with bladder empty; D, with bladder full (Van der Warker).

structural associations of the uterus and all the other pelvic organs and tissues. The position of the several pelvic organs may be given in a general way as follows: The uterus in the center, Fallopian tubes and ovaries on either side, the bladder in front, rectum behind, and the vagina below. Covering all of these, except the vagina, is the peritonæum, which is the chief bond of union between the upper portions of the pelvic organs, and out of which are formed the ligaments which have much to do in keeping the uterus in place. The peritonæum, while it covers the pelvic organs, is attached to the bony walls of the pelvis through the medium of the periosteum and areolar tissue, so that one end of each ligament may be said to have an attachment to the inner side of the pelvic bones. The round ligaments are anatomically an exception to this rule. They contain muscular tissue in considerable quantity, and are really outgrowths from the uterus in the form of round cords, which start from the uterus near the proximate ends of the Fallopian tubes, and sweeping round the outside of the pelvis, pass out through the inguinal rings into the labia majora. These ligaments, as well as all the others, can be seen by looking down upon the pelvic organs *in situ*. The uterus is seen in the middle of the pelvis, and extending across on either side of it are the two broad ligaments made up of the two folds of peritonæum, which unite after covering the uterus. Running backward from the uterus

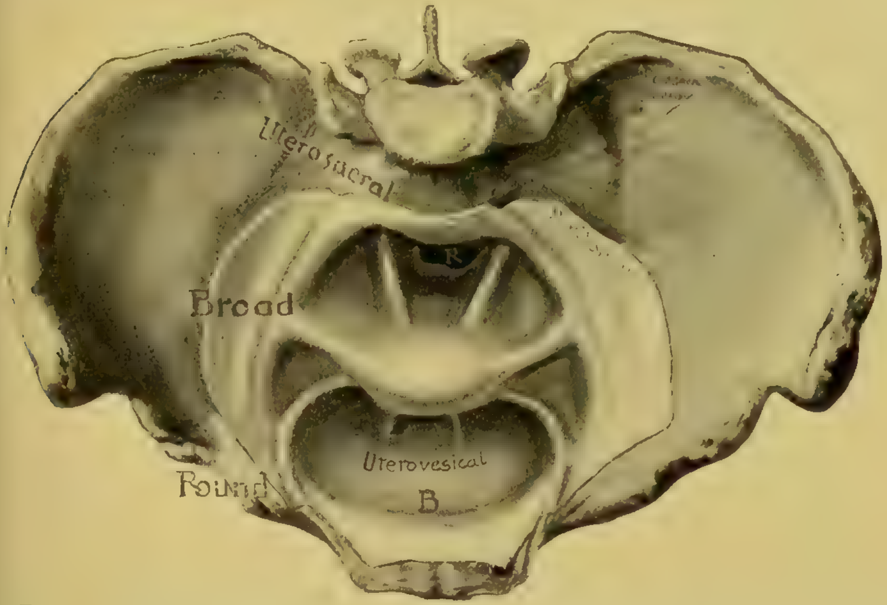


FIG. 136.—Diagram of the uterine ligaments as seen on looking into the brim. B, bladder.

to the sacrum are those peritoneal folds known as the utero-sacral ligaments. Between the uterus and the bladder, on the sides of the latter, the folds of peritonæum form the utero-vesical ligaments. These ligaments are so called not because they are composed of ligamentous tissue, but rather because they perform a function similar to that of ligaments. With the exception of the round ligaments which are composed of muscular tissue covered with peritonæum, the others are made up of double folds of peritonæum containing between these folds areolar tissue and some fibers of the pelvic fascia. An idea of the position of these ligaments and their relations to the uterus may be obtained from Fig. 136.

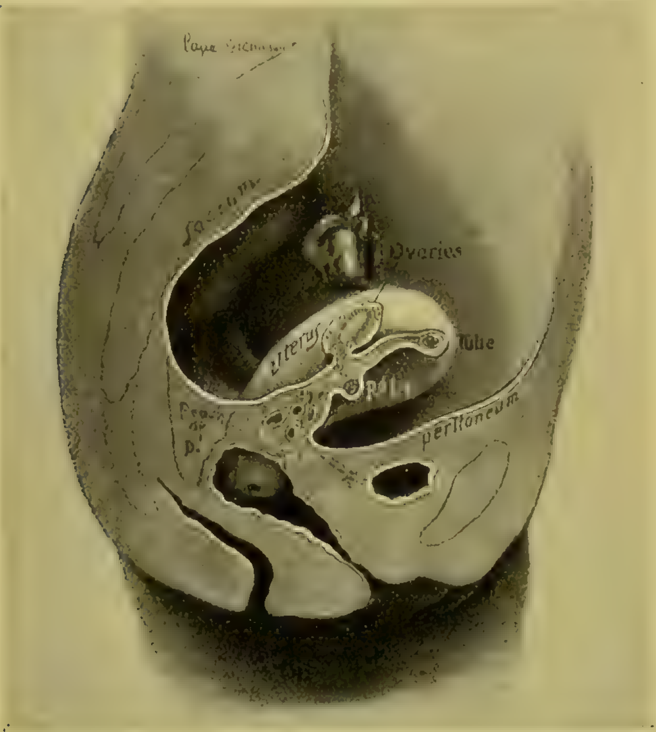


Fig. 137.—Section through the right broad ligament showing its relation to the uterus, tube, ovary, round ligament, and the vessels in its base.

I have noticed that, in the dissecting-room, gentlemen are not able at all times to find the utero-sacral and utero-vesical ligaments; the broad and round ligaments they easily note. The others can be brought into view in the following manner: If the uterus be drawn well forward by a tenaculum, two tense bands will be seen, the utero-sacral ligaments, extending from the side of the uterus back to the sacrum, and as they are thus raised up a pouch of peritonæum appears between them. This is the sac of Douglas. By reversing this manipulation, and drawing the uterus backward, the utero-vesical ligaments will be seen running forward on either side of the bladder.

The utero-vesical ligaments, in addition to their attachments to the uterus and bony walls of the pelvis, are also connected indirectly to the anterior vaginal wall by intervening areolar tissue. The utero-sacral are connected in the same indirect way with the upper portion of the posterior vaginal wall, and also to the rectum, on the left side at least. At the junction of the supra-vaginal portion of the cervix and body of the uterus all the ligaments, except the round ones, are attached. Here also the anterior and posterior vaginal wall and a portion of the bladder join these other structures. The union of these structures at this point is not direct, but is through the intervention of areolar tissue which is found in considerable quantity in this region. From this it will be seen that these ligaments are continuous from side to side, and also from before backward.

The chief function of these ligaments, aided by the anterior vaginal wall, is to keep the uterus and bladder in position. This is clearly evident from the mechanical principle apparent in the anatomical arrangement of the parts in question, and from the fact that the uterus remains in place for a considerable time when the pelvic floor is defective, and the abdominal pressure more marked than normal.

In short, many cases have been seen clinically in which all the other means that could possibly contribute to supporting the uterus were removed by disease and injuries, and yet the uterus was maintained in position under ordinary circumstances. The most rational idea of the means and ways by which the uterus is maintained in the pelvis I obtained from the following statement by Dr. Frank P. Foster. Speaking of the supports of the uterus, he says: "Ordinarily, they consist wholly of the anterior wall of the vagina in front, and the utero-sacral ligaments behind, which together constitute what may be called a beam traversing the pelvis antero-posteriorly on which the uterus rests, being interposed between them, firmly attached to the one anteriorly and to the other pos-

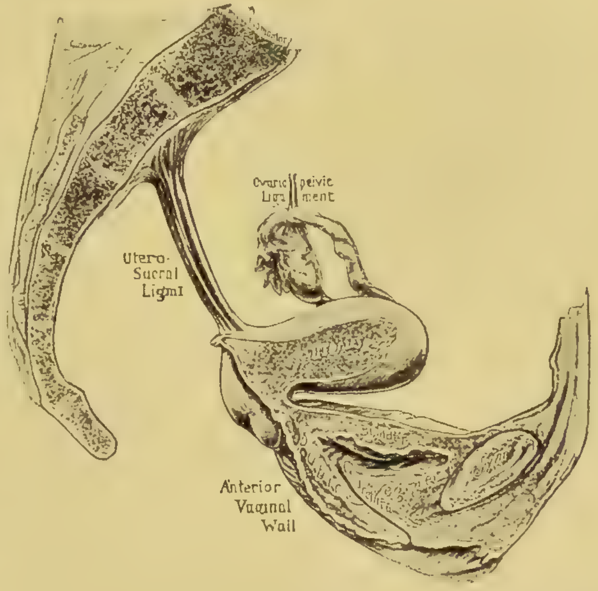


FIG. 138.—Section of pelvis, with the antero-posterior slings of the uterus; behind, the utero-sacral ligaments; in front, the anterior vaginal wall (after a frozen section).

teriorly, making them, so far as mechanical effect is concerned, one structure." This is a clear and comprehensive statement of the principles upon which the utero-sacral ligaments and the anterior vaginal wall act in supporting the uterus. I would go one step further than

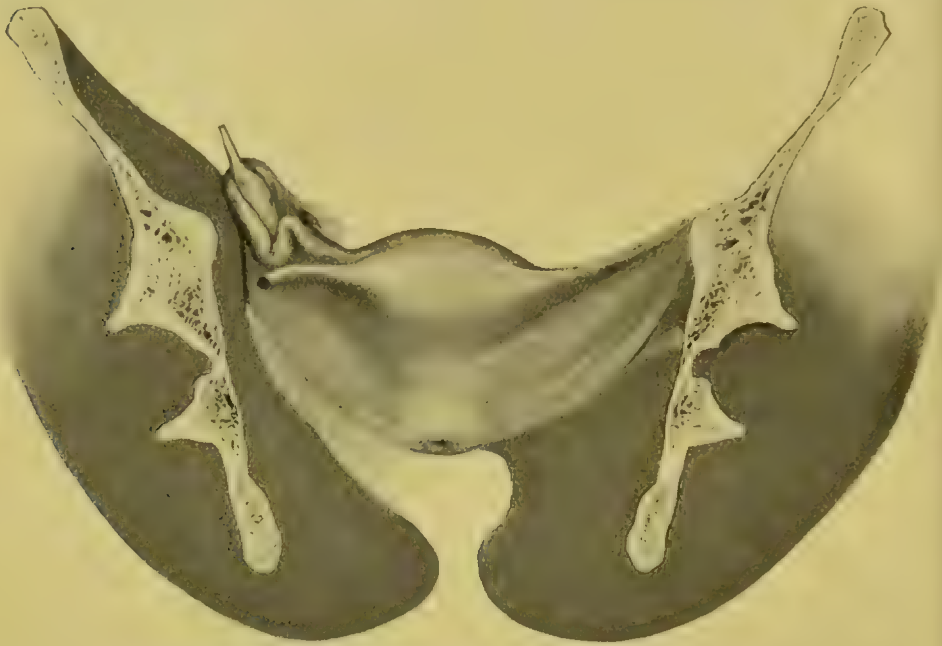


FIG. 139.—Diagram of the uterus slung between the broad ligaments in the true pelvis. The round ligament, tube, and ovary are shown on one side only.

Dr. Foster, however, and claim a like function for the other uterine ligaments. The broad ligaments, firmly attached to the bony walls of the pelvis, and holding the uterus in their folds, make a continuous structure extending across the pelvis in its transverse diameter.

These structures, taken together, act like " beams " or (to be more mechanically accurate) cables of a suspension bridge, which support to a large extent the uterus in its center. The utero-vesical ligaments also supplement the anterior vaginal wall as a supporting medium. According to this view of the subject, the chief supports of the uterus are the anterior vaginal wall, utero-sacral, vesico-uterine, and broad ligaments.

Fig. 138 shows a section of the pelvis with these ligaments and the anterior vaginal wall with the uterus resting upon them.

Fig. 139 shows a transverse section of the pelvis just in front of the uterus and broad ligaments, and represents these structures and the manner in which they support the uterus.

A similar function may be claimed for the round ligaments, at least so far as their effect in preventing the backward displacement of the uterus. Some have claimed that the round ligaments have but little supporting power to sustain the uterus in place, while others give it much credit in this direction. Those who believe in Alexander's operation of shortening the round ligaments for the relief of retroversion of the uterus certainly claim great supporting power for these ligaments, and with good reason, I think.

Finally, I may add, that I believe that the ligaments, the vagina, and the other pelvic organs all aid in keeping the uterus in position, and are sufficient to do so under ordinary circumstances. Still, when extraordinary strain is brought to bear upon the pelvic organs, the pelvic floor supplements these supporting structures. Moreover, the relation of the trunk to the pelvis has much to do, if not in keeping the pelvic organs in place, certainly in freeing them from pressure from above.

The pelvis is so placed that, in the erect posture, its cavity is behind rather than beneath the abdomen, and the abdominal muscles partially divide the greater cavity from the lesser. This is shown in Fig. 140, where the arrow indicates the direction of the force transmitted to the pelvis through pressure from above.

There is very little direct abdominal pressure upon the pelvic organs in the erect posture. The axis of the pelvis is backward and downward, while that of the abdomen is perpendicular, so that the pressure is indirect from above.

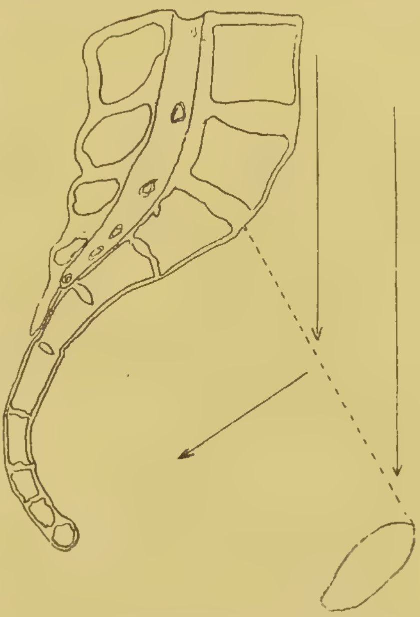


FIG. 140.—The normal inclination of the pelvis and the transmission of force from above.

Some claim that a suction power is exerted upon the pelvic contents by the diaphragm. It is said to act like a piston in the cylinder of a pump. There is reason to believe there is something in this explanation from the fact that, on examination through a Sims's speculum, the uterus is seen to rise and fall with respiration. This motion is to a large extent arrested when the patient is in the erect posture.

If it is a fact, as it appears to be, that the abdominal organs are fixed by suspension in their normal position, and that in their descent during this limited motion the pressure upon the pelvic organs is indirect, then this relationship contributes to maintain the position of the pelvic organs as surely as if there were some traction or suction action of the diaphragm tending to draw these organs upward.

In regard to the pelvic floor and its relations to the displacements of the uterus, that subject has been fully discussed under the head of injuries of the pelvic floor. It is only necessary to repeat my belief already expressed to the effect that, while the pelvic floor does not directly support the uterus, it indirectly aids in doing so, and if it is lost from injury prolapsus of the pelvic organs follows as a rule

DISPLACEMENTS OF THE UTERUS.

There are a great many forms of displacement of the uterus, if every change of position of that organ be taken into account, but of those that occur as primary affections there are only two that are often seen, and one that is very rare. These are downward, backward, and forward—that is, prolapsus, retroversion, and anteversion.

Prolapsus and retroversion are really the only forms of displacement which practically claim attention in this connection. These the gynecologist is called upon to treat daily as primary affections. Occasionally, a case of anteversion may be seen which apparently is not caused by some other affection more important than the consequent displacement, but this is exceedingly rare. Again the uterus may be anteverted to a considerable extent without causing the slightest trouble. This form of displacement (quite a rare one) is generally produced as a consequence of some other disease, either of the uterus itself or the organs and tissues around it, or else when it does occur it gives no trouble; and, as a rule, very little can be done to relieve it by the ordinary methods of treating uncomplicated displacements. Taking all this into account, it is evident that the downward and backward displacements alone demand special attention, either in practice or in the discussion of the subject.

The other forms of displacement of the uterus, described in text-books, are the right and left lateral anteversions and retroversions. These displacements are always due either to some lesion of development or to some previous affection, the products of which either push or pull the uterus out of place. There is also a retrocession of the uterus and an antecession, which are not described in books. Perhaps better names for these would be transposition backward or forward. In these dislocations the uterus is found either behind or in front of the axis of the pelvic cavity, or superior strait. These, like the lateral dislocations, are secondary to some abnormal state which caused them, and hence they are to be looked upon as signs and consequences of the primary disease.

By adopting this classification it simplifies the subject very much, and leaves one free to give attention to the downward and backward dislocations and their pathology, diagnosis, causation, and treatment. Again, the two forms of displacement in question are the only conditions of malposition that can be directly treated with favorable results. In the other forms, such as lateral versions, treatment must be employed to remove the morbid states which push or pull the uterus out of place, and therefore, the discussion of such displacements should be confined to the diseases which cause them.

PROLAPSUS OF THE UTERUS.

This is a downward displacement of the uterus commonly called falling. It is of necessity always associated with displacement of the other pelvic organs and tissues, to a greater or less extent, according to the degree of descent of the uterus.

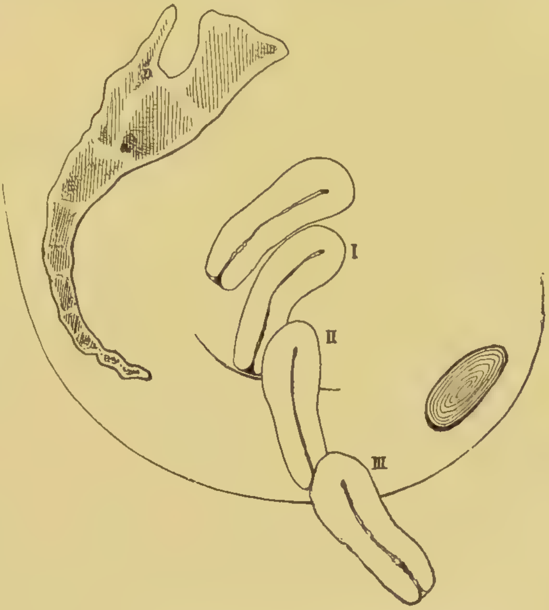


FIG. 141.—The three degrees of prolapsus. The upper outline is a little above the normal position.

There are several degrees of prolapsus uteri which have been variously described. While authors designate the most important stages of descent by degrees, it should be understood that practically there is no line of demarkation between the degrees. According to this arrangement, when the uterus sinks so that the cervix rests entirely on the pelvic floor, it is named prolapsus of the first degree; when the uterine axis has become vertical or coincides with the axis of the outlet, the cervix appearing at the vulva, the second degree is present; while in the third degree the organ is partly or wholly outside the introitus. Fig. 141 shows the three degrees, and may convey a clearer idea than further description.

By some authorities all the degrees of prolapsus in which the uterus still remains within the vulva are termed incomplete, while those in which it protrudes partially or completely beyond the vulva are called complete.

This latter arrangement of the subject is perhaps as easily comprehended and as useful in practice as any other. The complete degree is often spoken of as procidentia.

Pathology.—Prolapsus of the uterus takes place slowly, as a rule. Sudden prolapsus may possibly occur, but it must be a rare thing, except in the first degree. In the few cases that I have had an opportunity of watching from beginning to completion, the displacement has been gradual. At first the uterus descended to the first degree of prolapsus, and then to the second, and finally to the third or complete stage. The time occupied in making the complete descent varies from months to years. The changes which take place in the supports of the uterus and the other pelvic organs during the progressive development of the prolapsus are usually the same in all cases with few exceptions, but the order in which they appear differs according to the cause of the descent. This again depends upon the point in the structures at which the lesions begin to develop. There are three methods of development of prolapsus. In the first, the uterus begins to descend because it is too heavy and makes too great demands upon its immediate supports, or else these supports become defective from pathological changes. This is a descent of the uterus from loss of direct support. The second order of descent is by loss of the pelvic floor, which permits the vagina, bladder, and part of the rectum to descend, and then the uterus follows. The third in order is made up of the two others, the first and the second, all the conditions mentioned in those being operative at the same time.

The changes in the supports are elongation from imperfect involution after parturition, or stretching produced by enlargement of the uterus, or pressure on it from above by long standing, stooping, or lifting. In the former condition the supports are too long; in the latter they are attenuated as well as elongated. In both states the upper portion of the vagina is distended and the bladder slightly prolapsed or drawn backward. There is also, in some cases, loss of the areolar tissue, and the pelvic fascia has lost its strength of fiber. This traction upon the rectum, bladder, and the blood-vessels is presumed to interrupt the return circulation. Whether that is a fact as regards the causation or not, there is usually a passive hyperæmia of the parts in these displacements. These changes of the position and relations of these parts are gradually developed. In case the prolapsus proceeds to the third degree, the pelvic floor gives way under the influence of the continued pressure. The perineal muscles become overdistended and the vulva enlarged, until the uterus is permitted to protrude without resistance.

In the second order of the development of prolapsus—that is, where the loss of the pelvic floor is the starting-point of the malposition, the first lesions appear in the vagina. The walls of the vagina at the introitus begin to protrude and their descent is generally attended with increase of tissue. Usually both walls prolapse together, but in many cases one or the other takes precedence. As the prolapsus progresses the bladder and anterior wall of the rectum descend, producing rectocele and cystocele. In due time the uterus follows with all the changes in its supports already described above. There are cases in which the prolapsus begins at the lower part of the vagina, while there is no apparent injury of the pelvic floor. This has been accounted for by imperfect involution of the vagina after child-bearing. The large, heavy, and lax walls of the vagina make undue pressure upon the pelvic floor and it gives way before them. A similar state of things occurs, so far as appearances are concerned, where there has been subcutaneous laceration of the muscles of the pelvic floor which impairs its function.

Prolapsus of long standing changes the structure of all the tissues. Atrophy of the muscular tissue of the vagina and pelvic floor occurs, and the ligaments of the uterus lose their characteristics so that they can not be restored to their original state by any means.

There is a prolapsus which occurs as the result of degeneration of the supports of the uterus. It occurs in feeble old women in whom general nutrition is greatly impaired. The perinæum and vagina lose their elasticity, the adipose and areolar tissue disappear, and the vaginal walls, bladder, and atrophied uterus descend. Such patients are also subject to prolapsus of the rectum and sometimes prolapsus of the mucous membrane of the urethra. I have called this senile prolapsus to distinguish it from the ordinary descent of the uterus which usually occurs in middle life. I believe it to be due to the general atrophy of the pelvic viscera because of the time of life when it occurs, and the fact that I have seen it in those who have not borne children. The first case that I carefully studied was in an old maiden of seventy years of age.

Symptomatology.—The natural history of prolapsus uteri as manifested by symptoms and physical signs, differs to some extent in different cases, though the pathological conditions appear to be the same in all. The suffering caused varies according to the general health and nervous sensitiveness of the subjects affected. What is more strange still, is the fact that incomplete prolapsus often causes more suffering than the more advanced stages. It is not an uncommon thing to see a patient with complete prolapsus of the uterus who complains less than another in whom the uterus is still within the pelvis.

The symptoms indicative of prolapsus uteri may be classed under two heads: First, the derangement of the functions of the other pelvic organs, and, second, the disordered nutrition of the tissues of the pelvic viscera generally. The dragging of the uterus upon the bladder and rectum, and the abnormal pressure cause irritation, which gives rise to rectal and vesical tenesmus. The constant desire to evacuate the rectum and bladder, is often very distressing. These symptoms are greatly aggravated by walking, lifting, coughing, and especially by standing, and they are all relieved in a very marked degree, often completely so, by lying down. This difference in the feelings of the patient, when in the erect or recumbent position, is a diagnostic point of very great value. The recumbent position generally gives relief in the majority of the diseases of the pelvic organs, but not so markedly as in displacements of the uterus.

The malnutrition produced by irritation and deranged circulation leads in time to inflammatory affections of the uterus and other pelvic organs. This is not an acute inflammation which can be seen, but a hyperæmia accompanied by tissue changes such as areolar hyperplasia and catarrhal states of the mucous membrane. It is probable that the endometritis so common in prolapsus uteri may, in many cases, precede the displacement, but the displacement certainly tends to keep it up. The symptoms of these affections need not be given here.

The symptoms manifested by the general system in this affection are not marked nor special. Beyond the backache and deranged digestion which often accompany prolapsus, and the depression which comes from a consciousness of having some chronic ailment which impairs locomotion and general usefulness, there is not much that need be mentioned.

Physical Signs.—In prolapsus in the first degree, the uterus presses the posterior vaginal wall downward, and encroaches upon the rectum to some extent, at the same time it inclines backward. In some cases the cervix rests so heavily upon the floor of the pelvis that it becomes flattened. This is easily detected by digital examination, which reveals the descent of the uterus. The space from the pubes to the anterior wall of the body and fundus uteri is enlarged and remains so when the bladder is empty. The upper portion of the vagina is often relaxed and wider than normal.

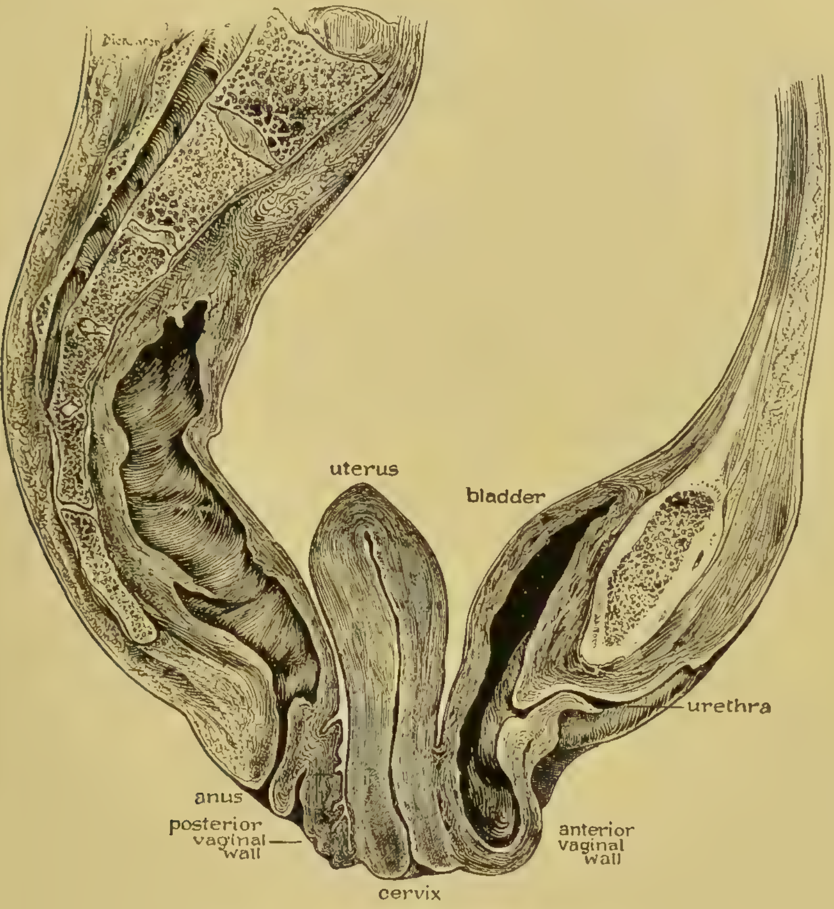


FIG. 142.—Prolapsus uteri with cystocele.

In the second degree of prolapsus, the os points toward the ostium vaginæ, and is at or near the vaginal outlet. The fundus uteri lies back toward the sacrum but not usually so far as in marked retroversion. In complete prolapsus the uterus protrudes from the vagina, and can be easily recognized by inspection. In this third degree of prolapsus, the bladder and anterior wall of the rectum are usually drawn with the uterus, and in extreme cases, the urethra also. The extent to which these organs accompany the uterus in its descent varies considerably. This may be determined by passing a sound into the bladder and ascertaining its direction, and the same means will show the extent of the prolapsus of the rectal walls.

Diagnosis.—The affections which simulate prolapsus uteri are hypertrophic elongation of the cervix, fibrous polypus, and inversion. A polypus and an inverted uterus may be excluded by the absence of the os and cervical canal, and by the fact that they are covered with the mucous membrane of the uterus, while the prolapsed uterus is covered with the mucous membrane of the vagina.

The elongation of the neck of the uterus can be detected by passing the sound, and at the same time pushing the uterus up into the pelvis, until the fundus can be detected by palpation of the abdomen; that is, by making the bimanual examination. The fact that this hypertrophy of the cervix occurs, as a rule, in those who have not borne children, will also aid in the diagnosis. There are cases of prolapsus in which the uterus is greatly relaxed, and becomes elongated, so that the sound, when passed to the fundus, shows a great increase in its long diameter. By replacing the uterus it becomes shortened very considerably; the shortening, I presume, is due to contraction or condensation of the tissues. This has been described by Emmet as a process of telescoping, but I think the term is ill chosen. One can not conceive of portions of the uterus being pushed into each other like sections of a telescope.

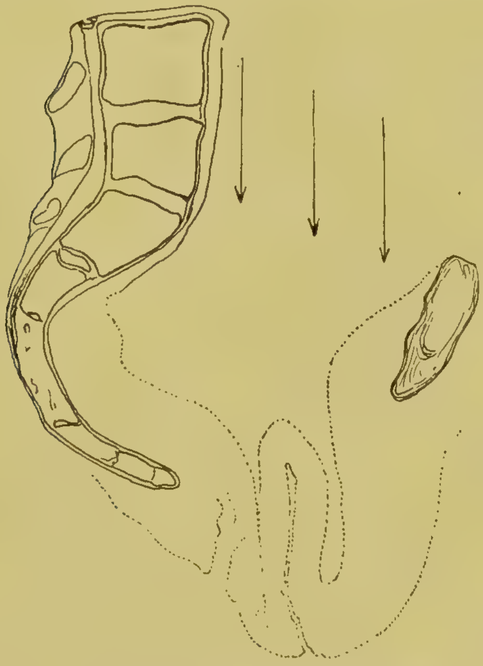


FIG. 143.—The shallow pelvis with lessened inclination of brim. The direct action of the pressure from above is shown by the arrows.

In the physical examination of prolapsus, care should be taken to discover any complications which may exist, such as neoplasms of the uterus, which greatly increase its size, abdominal tumors which crowd the uterus downward, and atrophy of the muscles of the pelvic floor and vagina.

Causation.—The fine adjustment of the uterus and the means which keep that organ in its place, and yet permit considerable motion, are such that any increase of weight of the one, or loss of strength of the other will cause displacement. The formation of the pelvis, and its position in relation to the vertebral column: the character of the fiber of the uterine supports, the quantity and consistence of the areolar and adipose tissue; one's habits in regard to clothing, position in standing and sitting, if maintained unduly long, character of occupation, strength or weakness of general organization; and the accidents and injuries incident to child-bearing, all have certain influences in causing dislocations of the uterus.

A shallow and wide pelvis (Fig. 143) which is more than sufficient for the accommodation of its contents, while it is favorable to easy parturitions, predisposes to descent of the uterus. Again, if the pelvis is tilted forward, so that it is brought more immediately under the axis of the abdomen (Fig. 143) the pelvic organs are constantly under greater pressure than normal, and prolapsus and retroversion are likely to occur. These facts regarding the form and position of the pelvis are factors of great importance in the problem of uterine displacement, and deserve more attention than has been given to them.

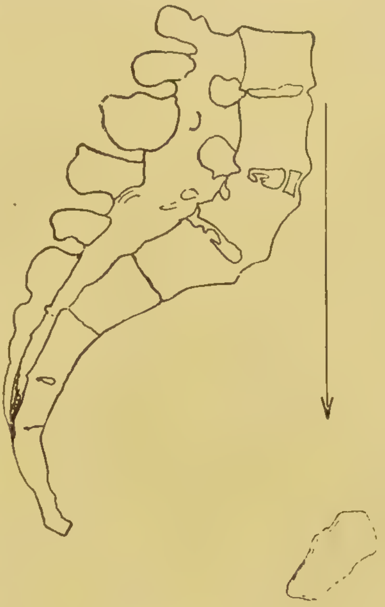


FIG. 144.—Increased inclination of inlet. Pelvic organs escape pressure.

The habit of walking erect has the effect of maintaining this favorable relation of the abdomen and pelvis, while stooping disturbs this harmony of relative positions. In this, both in regard to formation and habit of standing and walking, there is the greatest diversity among women. The tissues of the uterine supports, when defective in quantity or quality, are incapable of performing their functions. These effects may be the result of imperfect development such as occurs in those of sedentary habits in youth, or they may come from debilitating diseases. In the one case they have never been well developed, and in the other they have become atrophied. Standing and walking to an extent that is fatiguing, bring undue strain upon the pelvic organs, and if persisted in, will in time produce prolapsus. Active exercise, with liberal periods of rest, will tend to strengthen the uterine supports, but fatigue will overcome their power of resistance. Stooping forward while in the sitting position has a two-fold injurious influence—it interrupts the return-circulation in the pelvis and impairs the nutrition of the organs and brings increased downward pressure to bear on them. The position of the girl at the sewing-machine and that of the lady of leisure, bent over in her easy-chair while reading a novel, are alike hurtful, but worst of all, the school-girl, bending over her desk all day, while her body is, or should be developing, suffers the most injury. Among the errors in the use of clothing, the abuse of corsets does the most harm. I would not be understood as condemning corsets. Long use has rendered that kind of support necessary to highly civilized women, but tight-lacing forces the abdominal viscera out of place and in time displaces the pelvic organs.

Heavy lifting, if persisted in, is a cause of displacement. This is noticed among the poor who do heavy work. The women of India, who were at one time supposed to bear children with ease and impunity, and to suffer less from uterine affections than our American women, are very subject to complete prolapsus uteri, caused no doubt from their want of care after confinement and in carrying heavy burdens. General weakness, induced by exhausting diseases and extreme old age, affects the pelvic organs very decidedly. This, no doubt, is the cause of prolapsus uteri in women with consumption and in the very aged.

The most important, certainly the most frequent, causes of uterine displacement are the injuries and improper management incident to child-bearing. The condition of the uterine supports after parturition is that they are all greatly enlarged through the growth of gestation, and, while they are competent to maintain the large uterus which rests in the abdominal cavity, they must undergo involution in conjunction with the diminution of the uterus. If this involution fails in the uterine ligaments and vagina while it goes on in the uterus the supports fail, because they are too long and relaxed. Imperfect involution, not only of the uterus but of all the other tissues and organs of the pelvis, is seen to give rise to displacement. This imperfect involution may be due to post-partum inflammation or to the patient resuming the active duties of life before involution is completed. In regard to the injuries of the pelvic floor and their effect on the position of the uterus the reader is referred to the chapter on that subject.

Finally, enlargement of the uterus, whether from imperfect involution, inflammation, or the presence of neoplasms, will cause prolapsus. This will occur although all the supports may be normal; the balance between the supports and the organs to be supported being disturbed by the increased weight of the uterus, descent will occur.

It should also be borne in mind that the abnormally large uterus will prolapse in spite of the normal supports, while, on the other hand, defective supports which permit a normal uterus to descend will give rise to enlargement of the uterus by congestion, swelling, and, finally, hyperplasia, and by this increase of weight will incline it to remain displaced.

TREATMENT OF PROLAPSUS UTERI.

There are four important objects to be attained in the treatment of prolapsus uteri: to restore the displaced organ, to keep it in place, to restore the supports of the uterus, and to remove complications and accompanying affections if any such exist.

The restoration of the uterus to its proper place is performed as follows: The patient is placed in Sims's position, and, if the prolapsus is complete, the uterus is grasped in the fingers, and, while compression is made, it is pushed upward in the axis of the pelvic cavity. By these means the displacement is reduced from the third degree to the second; then the perinæum should be retracted with Sims's speculum, and with two sponges in holders the uterus should be raised to its normal elevation. Difficulty in accomplishing this is sometimes caused by the fundus uteri turning backward while the upward pressure is being made, so that, in place of overcoming the displacement, the prolapsus is changed to a retroversion. This can be guarded against by making the pressure mostly on the posterior side of the cervix. Passing the sound and making it guide the uterus in the right direction while upward pressure is being made is another way of managing difficult cases. While these manipulations are being made the patient should relax the abdominal muscles by avoiding all straining. Many patients fail to obey orders in this respect; they continue to hold the breath, and strain as if preparing to resist the pain of some injury about to be inflicted upon them. I have overcome this annoyance by causing the patient to take long regular respirations while being treated. In rare cases, in which much difficulty is met in replacing the fallen uterus, the patient should be placed in the knee-chest position, and then the chances are that the uterus will slip back to its position without much help. If any aid is needed it can be given by the sponges in holders, or what is quite as good, if not better, in manipulating with the patient in this position, is to use one or two fingers in place of the sponges. With a very limited experience and a knowledge of the methods described any one can manage this portion of the treatment. To keep the uterus in place is the question which is not easily settled. The object of all the mechanical means which may be employed is, first, to keep the organ in position and thereby give relief; at the same time, through the agency of the artificial support and other means, to restore the natural supports.

If the prolapse is not beyond the second degree, and is due to relaxation only of the uterine supports, and not associated with any injury that destroys the integrity of the pelvic floor, the uterus may be retained by means of a pessary or tampon until the supports recover their original strength. In connection with these mechanical means, rest in the recumbent position is one of the most important factors in bringing about the desired result.

The material used for the tampon should be absorbent cotton, wool, or lint. To simply keep the uterus in place wool is no doubt the best. It is soft and least irritant to the tissues. When there is any vaginitis or endometritis causing a free discharge, marine lint does better. It takes up the discharge, disinfects it, and prevents decomposition. This it does better than either cotton or wool. In some cases lint is irritating to the tissues and can not be long continued. Sometimes I have used wool and lint alternately with much satisfaction.

Since the introduction of antiseptic material for dressings, the tampon has been far more useful in surgery. In the past when sponges, not well prepared, were used, they could be retained in place but a few hours without causing decomposition. Now the marine lint or borated cotton can be worn twenty-four or forty-eight hours without being offensive.

For those who have vaginitis or any inflammation of the uterus I direct that the tampon be applied in the morning after having used the douche of hot water, plain or medicated. At night the tampon is removed and the douche again used and afterward the tampon replaced, if the uterus will not stay in place without it, but omitting it for the night if the recumbent position will overcome the tendency to displacement. When there is no inflammatory complication the tampon may be left in place two days and a night. At the end of the second day it should be removed at bed-time and replaced next morning, the douche being used after removal and before introducing it again.

Astringents of various kinds have been employed with the tampon, the cotton being saturated with the solution to be used, or the agent may be employed in powder. The latter is much the preferable way when the milder astringents are selected. As a rule I pre-for the borated cotton or marine lint alone, using such astringents as may be required in the douche.

In many cases there is some loss of the pelvic floor from previous injury. This structure should be restored as soon as the tissues are in a condition to warrant surgical treatment. As a rule, in those cases of prolapsus which have existed for some time, the nutrition of the tissues is impaired and needs treatment preparatory to operating. For a more complete discussion of this subject the reader is referred to the chapter on injuries of the pelvic floor.

Keeping the uterus in its position by the tampon and other means of support has the effect of not merely relieving the prolapsus, but also of giving the uterine ligaments every chance to regain their normal condition. Artificial support is palliative and curative as well. The mechanical supports used in the treatment of prolapsus include a variety of devices. The pessaries used are of two kinds—those that are placed in the vagina and are held in position by the pelvic floor, and those that are held in place by being attached to a strap round the waist. The former are applicable in the first and second degrees of prolapsus while the pelvic floor remains normal or nearly so. The latter are used in complete prolapsus, and in those cases where there is so much loss of the pelvic floor that it will not keep the pessary in position. When the perinæum is sufficient to support the vagina and the prolapsus is limited to the first or second degree, the instrument known as Peaslee's pessary answers very well. It is a simple ring made of whalebone and covered with soft rubber. When in position it rests upon the pelvic floor. It should admit the cervix without making pressure upon it, and should fit the upper portion of the vagina without distending it to any appreciable extent. It acts by carrying the upper portion of the vagina and the cervix backward into the normal position, and at the same time raises the uterus to a very slight but sufficient extent. If well adapted it takes off the pressure from the lower part of the vagina and permits it to contract and regain its tonicity. Fig. 142 represents prolapsus in the second degree. Fig. 145 shows the pessary in position after the uterus has been replaced.

When there is relaxation of the pelvic floor due to the prolapsus it is necessary to keep the patient at rest much of the time during the first week or two that the pessary is worn. If this is not practicable a perineal band should be worn to support the pelvic floor while the patient is exercising. In the progress of the treatment the vagina should contract when the uterus is supported by the pessary. This, in time, requires that a smaller instrument should be used. The rule is that the smallest instrument should be employed that will keep the uterus in place. If too large a pessary is used it will keep the uterus in place, but will overdistend the vagina and weaken the supports of the uterus in place of restoring them.

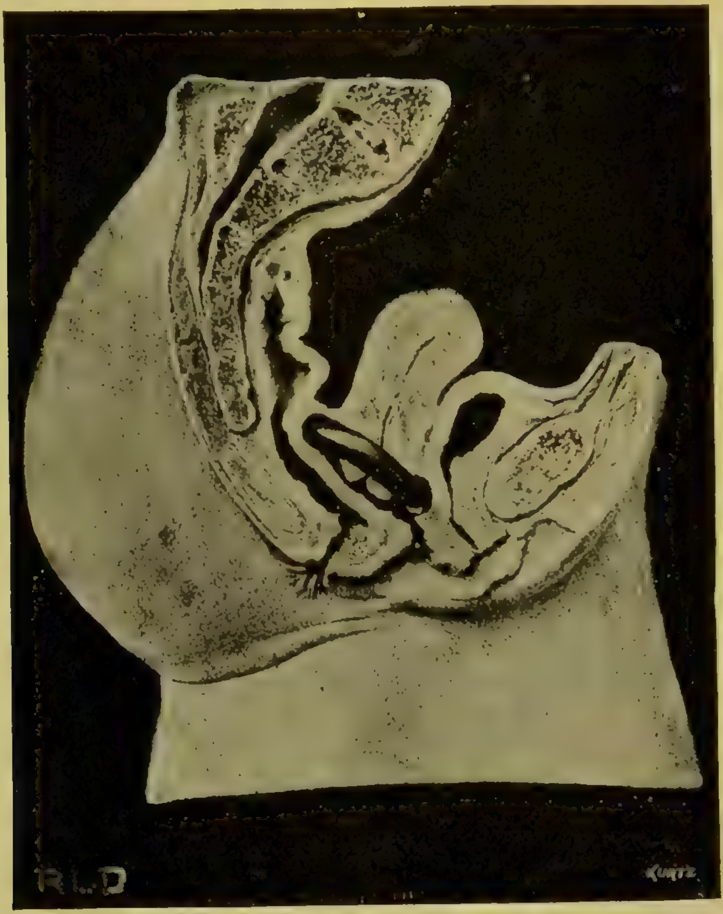


FIG. 145.—Uterus replaced, with pessary in position.

One great advantage which the ring pessary has is in being easily introduced or withdrawn, and that it does not become displaced except to settle downward, and this can be easily corrected by the patient assuming the knee-chest position from time to time.

When the uterus inclines to retrovert after having been elevated, a common occurrence, a retroversion pessary will act better than the ring, but the use of that instrument will be more fully discussed under the head of retroversion.

Prolapsus occurring after the menopause when the uterus has undergone final involution, may be relieved in some cases by the old glass-globe pessary. It certainly is the best instrument that I have found for old patients having prolapsus of the vaginal walls, bladder, and the remains of the atrophied uterus, if the pelvic floor remains sufficient to support the pessary. It simply keeps the uterus and bladder up in the pelvis by distending the vaginal walls. The uterus may be anteverted or retroverted, but is so small that it makes no difference what position it occupies so long as it is kept high enough up.

The globe is easily used. In fact no mistake can be made with it except to use one that is too large. This must be avoided, because one that is too large will cause vaginitis and ulceration. It is a fact also that the pessary which answers when first used will be too large when the parts regain some of their original tonicity. For a time the patient should be kept under observation and the instrument changed to suit. This globe pessary is the most troublesome instrument to remove. I have usually succeeded by using a small Sims's speculum and a Sims's vaginal depressor, and seizing the instrument between the two and making traction. When this fails, a pair of miniature obstetric forceps should be made out of strong copper-wire, by doubling it to form loops and twisting the ends to make the handles. With this the globe is very easily grasped and removed. The intra-vaginal pessaries, such as the ring and globe already mentioned, and all others that rest wholly within the vagina are liable to slip down and give the patient great discomfort, and sometimes they come away entirely. This is especially the case when first introduced. To obviate this, a perineal band should be worn until the perinæum, upon which the pessary depends for support, regains its tonicity. By this arrangement the same results are obtained as by the use of the cup and stem pessary, to be noticed hereafter—in fact, better results so far as the comfort of the patient and the final effects are concerned; therefore, I have always endeavored to relieve prolapsus when possible by the intra-vaginal pessary.

Several uterine supporters have been devised to meet the requirements of cases in which the pelvic floor is relaxed from long distention, so that it has not power to sustain a pessary in position, and the patient's circumstances will not permit long rest in the recumbent position and the use of the tampon.

They are all constructed on similar principles of mechanism and action—namely, cup and ring to receive the cervix uteri, and a stem attached which projects from the vagina and is fastened to a perineal band, which in turn is attached to a waistband. The advantages claimed for this kind of uterine supporter are that if properly adjusted it will certainly keep the uterus in place, and the patient can remove and readjust it when desirable. These are valuable features no doubt, and may be fairly claimed for the instrument as a rule, but not without many exceptions. There are cases where this form of instrument, while it will keep the uterus at its proper elevation, will not keep it in its proper axis without very great care in its adjustment. Under such circumstances the patient can not remove and replace the pessary with any satisfactory results. While pushing up the uterus, during the introduction of the pessary, a retroversion takes place, and wearing the instrument only aggravates that form of displacement. The further objections which may be placed over against the advantages of this kind of pessary are that it can not be worn for any great length of time without doing harm and causing great discomfort, and where in a given case the patient can not adjust it properly herself it will do more harm than good, and should not be employed on any account under these conditions. Again, in the most favorable cases, it is a constant source of irritation, less or more. The vulva is irritated by its presence and usually becomes inflamed in time; the pressure of the cup against the cervix and upper end of the vagina causes inflammation and ulceration, if the patient takes much active exercise. The reason for this is that the pessary is firmly fixed by its support outside of the body and the movements of the pelvic organs against this fixed instrument cause great friction. The intra-vaginal pessary moves with the pelvic organs, but the stem pessary does not accommodate itself to the requirements, and hence its power to do harm.

From the little that has been said, it will appear that the use of the vaginal stem pessary for the relief of prolapsus is most unsatisfactory. All that can be said of such means of support is, that in some cases they may be used for a time in the hope of helping to restore the natural uterine supports. Dr. Paul F. Mundé has truly said, "The ideal pessary for complete prolapsus uteri is yet undiscovered." The instrument which I have found to answer best of the stem pessaries is a modification of Cutter's (Fig. 146).

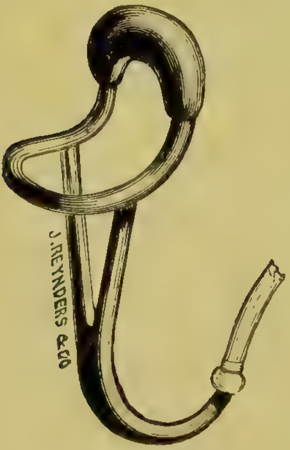


FIG. 146.—Stem pessary. Modification of Cutter's.

These pessaries should be fitted with care, and just here another difficulty is encountered in the fact that they are all made of one size and shape, so that it is difficult to change them to suit special cases. This I have tried to overcome by making the stem flexible, or rather so that it can be molded, and capable of being shortened, so that it can be made to suit each case.

Fortunately, stem pessaries are rarely needed, and, I may say, that every year I find less need for them.

By a careful and judicious use of the ring and the tampon, aided by the T-bandage to support the pelvic floor, one can accomplish nearly all that can be done by these artificial supports.

The important facts in connection with pessaries already mentioned, may be recapitulated here, and they should be borne in mind. They are as follows: First, these means of relief for prolapsus mostly are temporary and palliative, and can only keep the uterus in place until the tissues are prepared for the operation of perineorraphy when the pelvic floor has been injured; second, they keep the uterus in place till the normal supports are restored; and, third, they reduce a complete prolapsus to an incomplete, when an intra-vaginal pessary will answer the purpose.

While these artificial means of support are being employed, efforts should be made to strengthen the parts and to remove all complications which tend to keep up the prolapsus, astringent injections should be continued, standing and walking should be limited to an amount which is sufficient for exercise, and lifting heavy weights and wearing tight and heavy clothing should be avoided. The bowels should be kept free, so that straining at stool may be unnecessary. This last point should be carefully attended to. Constipation is a potent cause in producing and keeping up prolapsus. The general health should be cared for, and if there is any debility it should be met by the proper tonic treatment.

In some of the most favorable cases complete relief will be obtained by the means described, so that all mechanical supports can be given up. Care should be taken not to remove the pessary too soon. I have found in cases of prolapsus that it is best to reduce the size of the pessary by changing from time to time to a smaller one.

Martin, of Berlin, has reported one hundred and ninety-two cases in which he has operated for the cure of prolapsus. In all but six he was obliged to perform an operation upon the cervix; in three nstances it was necessary to extirpate the entire uterus. In one hundred and seventy-one cases silk sutures were used, in seventeen the continuous catgut, the latter being highly commended, although it is noted that it is not safe to depend entirely upon these, as secondary hæmorrhage may occur if they are not re-enforced with silk. Relapses occurred only eleven times, and those, too, in old subjects. The operations performed were anterior and posterior kolporrhaphy, with perineorrhaphy.

In comparing my own results with the above, I find that I have succeeded as well by the combined use of mechanical supports and surgical operations. That in the treatment of prolapsus, where operating upon the cervix uteri and pelvic floor has failed, kolporrhaphy has also been useless. I have, therefore, abandoned that operation.

TREATMENT OF PROLAPSUS BY GALVANO-CAUTERY.

Dr. John Byrne, of Brooklyn, has treated successfully nine cases of prolapsus of the uterus by galvano-cautery. In three, the cervix uteri was completely amputated with the galvano-cautery. The other six were treated by partial amputation of the cervix. The description of the operation is given by Dr. Byrne as follows:

"A diverging double tenaculum was passed into the cervical canal and fixed in the tissues so as to secure complete control of this part. The entire mass was next returned within the pelvic cavity, and the uterus elevated sufficiently to show the line of vaginal insertion in its entire circumference. While in this position, a small platinum knife, brought to a red heat, was slowly carried around the base of the cervix, close up to the vaginal fold, and to a depth sufficient to accommodate a platinum loop, and to insure it against slipping. The latter was next adjusted, and the amount of battery immersion being duly estimated to guard against overheating of the wire, the loop was slowly and with intermissions contracted, until about one quarter of an inch in depth had been reached. The wire was now removed, and a firmly-rolled tampon, one and a half inch in diameter and four inches long, smeared with glycero-tannin, having four per cent of carbolic acid, was passed into the vagina, and a T-bandage applied."

Two of the six cases required linear cauterization of the vaginal walls as well as partial amputation. The following is Dr. Byrne's description of the operation:

"The parts having been returned as in the former case, the line of vaginal insertion was noted, and merely marked in spots by the cautery knife. The entire mass was then brought down and out, and with the same instrument a deep, circular fissure about three eighths of an inch in depth was made around the entire circumference of the cervix, the knife being carried upward and inward in the direction of the os internum, and precisely as I am accustomed to do in suitable cases of carcinoma. This being done, three diverging fissures were made, one central, one toward either side on the anterior, and one only on the rectal surface, starting from and connecting with the circular incision for a distance of about three inches; care being taken that the entire depth of the hypertrophied vaginal membrane should be incised."

I am unable to speak from experience regarding this method of treating prolapsus of the uterus. The histories of the cases given by Dr. Byrne in the "Transactions of the American Gynecological Society" for 1886, are very satisfactory.

CHAPTER XVIII.

RETROVERSION OF THE UTERUS.

Retroversion of the uterus is a change in the axis of that organ in which the fundus points toward the sacrum and the cervix turns toward the symphysis pubis or vaginal outlet. This displacement varies in extent in different cases; three degrees are usually described. In the first degree the fundus points toward the promontory of the sacrum; in the second the uterus lies almost transversely in the pelvis; and in the third the fundus is low down in the pelvis, while the cervix is thrown upward at a higher elevation than the fundus.

Retroversion is usually progressive, except in the first months of pregnancy and in the puerperal state. In these conditions retroversion may occur abruptly, and so it may under other circumstances, but usually it comes on gradually, passing from the first degree to the second, and on to the third.

It is exceedingly rare to find retroversion in the first degree existing for any length of time, the displacement usually passing on to the second and third degrees.

The anatomical changes which take place in backward displacements are to some extent the same as those found in prolapsus. The same changes in the supports of the uterus are found, and though differing in detail are the same in kind. This arises from the fact that nearly every case of prolapsus is associated with more or less retroversion, and in nearly all cases of retroversion there is also a slight prolapsus. These changes have been discussed under the head of prolapsus, hence it is only necessary for me to point out here the anatomical features which are particularly concerned in retroversion.

In retroversion there is shortening of the posterior vaginal wall by contraction. The exceptions to this are when there is rectocele, and in recent cases in which the vaginal wall is apparently shortened, but in reality is thrown into folds. The anterior vaginal wall is generally distorted rather than displaced. Its upper end is crowded upward and sometimes forward by the cervix uteri, and its lower part is sometimes pressed downward and forward, giving it the appearance of a urethrocele.

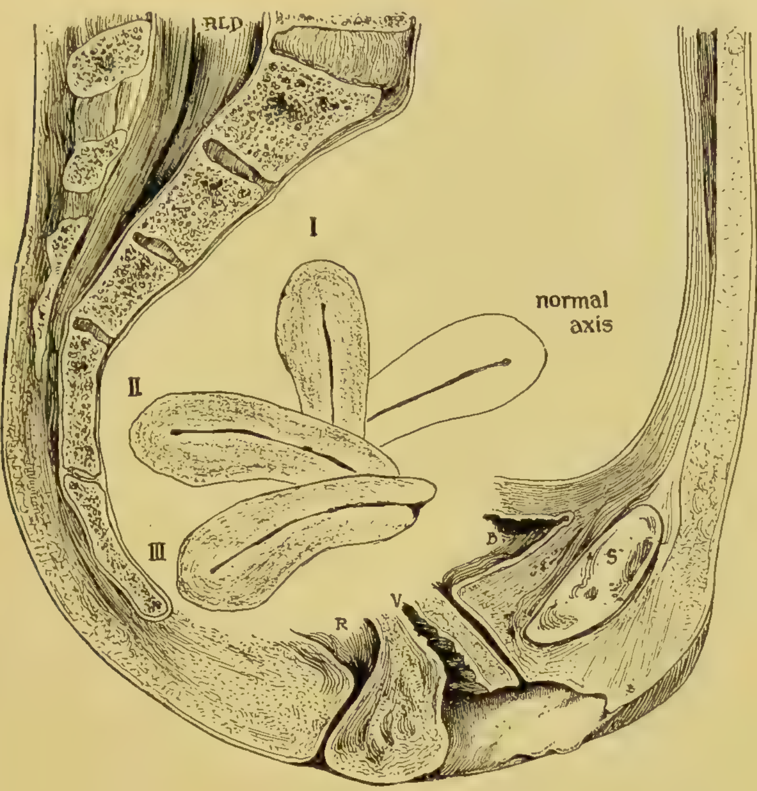


FIG. 147.—The three degrees of retroversion.

The relations of the cervix and vagina are changed more or less in the majority of cases. In some the projection of the cervix into the vagina is apparently very much increased posteriorly. To the touch the vagina appears to be attached to the whole length of the cervix. This is apparent, not real, and is usually found so when the vagina has still maintained its tonicity. In other cases, with marked shortening of the vaginal wall, the invagination of the cervix is lessened. Nearly always the invagination of the cervix anteriorly is less than normal. The position of the uterus as regards elevation varies greatly in different cases. This may be normal in the pelvis, simply changed in its axis, or it may be prolapsed so that the cervix is close to the vulva, the anterior vaginal wall being much shortened. Again, the posterior wall of the uterus may rest upon the pelvic floor and altogether be placed far back in the pelvis, so that the fundus presses upon the rectum, while the bladder may not, as a rule, be much affected, either in its position or function, though it sometimes is. The pressure of the uterus being removed from behind, there is nothing except the vesical ligaments to prevent the bladder from extending backward when distended. It then rests upon the retroverted uterus instead of rising up toward the abdominal cavity, and the ovaries and Fallopian tubes are to some extent carried backward and downward with the uterus. The extent of this displacement varies greatly. In some cases there is complete prolapsus of one ovary, or of both of these organs, so that they lie in the sac of Douglas and the uterus rests upon them. In other cases the ovaries rest upon the retroverted uterus. One case of this kind

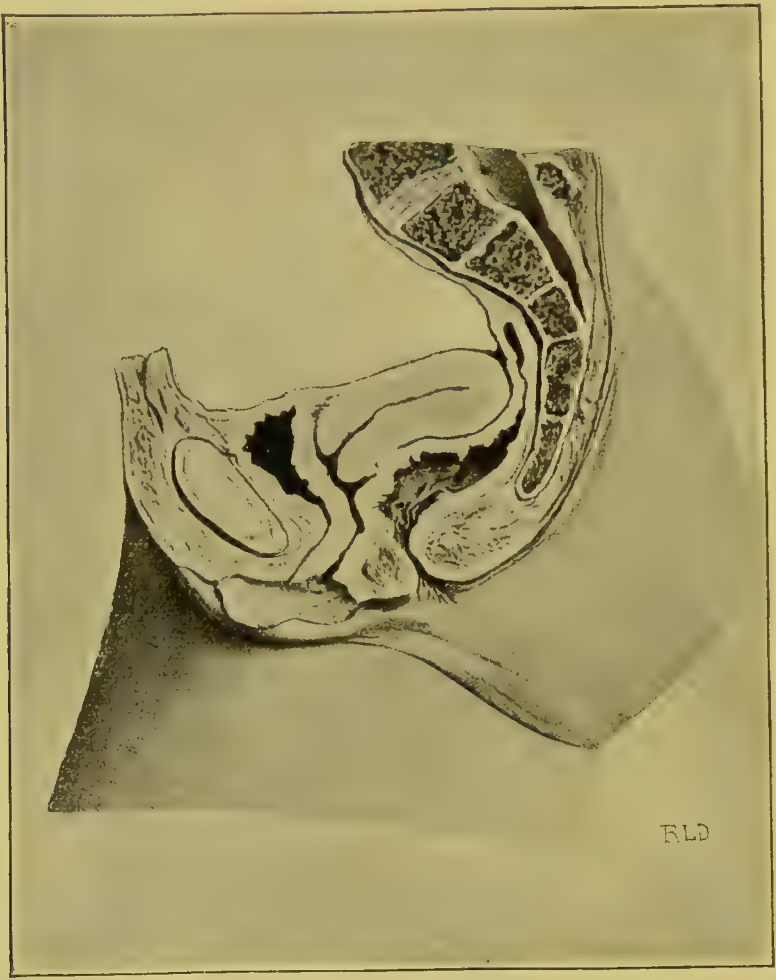


FIG. 148.—Retroversion of the second degree.

I well remember to have operated upon. The ovaries were diseased and gave so much trouble that I decided to remove them. One was in its normal position, the other, the right one, was adherent to the side of the uterus. This prolapsus of the ovaries is one of the worst complications of retroversion.

There is a strongly-prevailing opinion that the circulation in the pelvic organs is much deranged by retroversion, and that changes of structure of these organs follow in consequence. How far this is a fact it is difficult to determine. It is true that in nearly all cases of retroversion are found some congestive inflammatory trouble and structural changes, either from degeneration or hyperplasia, but whether these changes preceded the version and perhaps aided in producing it, or whether they resulted from the change of position, can not at all times be ascertained. There is good reason for believing that all malpositions cause deranged nutrition which in time lead to organic changes, and still such pathological conditions are found when there is no displacement, showing that these relations of cause and effect are interchangeable in displacements and some other diseases of the uterus.

COMPLICATIONS.

There are cases of retroversion so complicated that they are permanent and incurable. These should be clearly understood; hence I refer to them briefly in this connection.

There are two classes of such cases: Those which have had pelvic peritonitis while the uterus was retroverted, the adhesions made by the products of the inflammation permanently fixing the uterus in its malposition. I presume that a similar result is sometimes produced by pelvic peritonitis, the products of which (behind the uterus) will by contracting drag the uterus into the position of retroversion. This complicated form of retroversion has been considered incurable, but recently encouraging efforts have been made to relieve it by surgical treatment. This subject will be referred to and discussed at the end of this chapter. The other class is one in which a similar condition occurs as the result of malformation or congenital malposition. In cases of this kind the uterus is retroverted, the posterior vaginal wall short and rigid, the utero-sacral ligaments are short and rather unyielding, and although the uterus is slightly movable it can not be restored to its proper place. In such case the pelvis is wide and shallow, and there is often a lack of cellular tissue around the pelvic organs. When I first had my attention directed to this class of cases I presumed that they must have had pelvic peritonitis, but in many of them there was no evidence obtained from the past history to warrant any such conclusion. Further investigation satisfied me that the lesions were the result of perverted development and growth. Some of these cases do not suffer much, but they are sterile as a rule.

Symptomatology.—The clinical history of retroversion, so far as the symptoms are concerned, is not sufficiently definite to be diagnostic. Many of the symptoms are common to prolapsus and certain other affections of the uterus. Another curious fact is that the suffering caused by retroversion varies greatly in different patients. The rule is that retroversion causes much discomfort, but I have seen one patient who had retroversion for many years and yet was one of the most active women I have ever known, and was perfectly free from all symptoms of any affection of the pelvic organs.

The symptoms which belong more especially to retroversion are rectal tenesmus and the feeling of obstruction to a free action of the bowels.

Backache, general pelvic tenesmus, aching of the limbs, irritation of the bladder and rectum, neuralgic pains in the pelvis, and the fact that these symptoms are aggravated by walking and standing and are relieved in the recumbent position, are all evidences of retroversion, but also occur in prolapsus.

Menstruation is frequently deranged and menorrhagia, dysmenorrhœa of a mild form, and irregular recurrence of the menses, have all been traced to this form of displacement; but all these are more frequently caused by other affections. In several cases that I have seen, the menstrual discharge was offensive and very distressing to the patient. This symptom I have noticed more frequently in retroversion and retroflexion than in any other affection of the uterus.

Physical Signs.—The physical signs are obtained by the touch and uterine sound. The vaginal touch reveals the os uteri pointing toward the introitus vulvæ, or in extreme cases, toward the symphysis pubis. The anterior vaginal wall is often found projecting downward in front of the cervix. The upper portion of the posterior vaginal wall is found to be pressed downward and forward, so that the junction of the posterior cervical wall of the uterus and the vagina are much nearer to the vulva and more easily touched with the finger. In some cases this prolapsus of the posterior vaginal wall is very marked, and appears to aggravate the version by pushing the cervix against the bladder.

If the bladder is empty and the muscles of the abdomen are relaxed, the bimanual examination will show that the uterus is not in its normal position, but must be retroverted, as indicated by the signs obtained by the vaginal touch. These signs of retroversion, while quite reliable, might, in rare or complicated cases, be misleading, so that it is well to confirm or correct by the use of the sound the evidence obtained by the touch. Placing the patient on the left side and using Sims's speculum, the sound can be passed with ease, and its direction will show the dislocation of the uterus.

In doubtful or complicated cases, when all the evidence is needed that can be obtained, the rectal touch may be employed. The finger in the rectum can be swept all around the fundus and body of the uterus while it lies low down in the sac of Douglas in the retroverted state. The rectal touch can be made more effective still by making the abdominal or vaginal touch at the same time. By these means of examination a diagnosis can be made with the greatest certainty, and proof of the accuracy of the diagnosis may be obtained by replacing the uterus. Regarding the conditions which may be mistaken for retroversion and the differentiation little need be said. The question which most frequently arises is whether there is retroversion or retroflexion. This can always be settled by the evidence obtained from the physical signs already obtained, and the fact that in flexion the uterus is bent upon itself, a fact that is noticed by the touch and confirmed by the use of the sound.

Causation.—The causes which produce prolapsus uteri are apparently the same as those which give rise to retroversion. The reader may refer back to the causation of prolapsus for the facts regarding this matter. This will save repetition. It is clearly evident, however, that while there may be much in common in the causation of the two forms of uterine displacement, prolapsus and retroversion, there must be some difference in the causes which produce such different effects. This appears to have been quite an obscure subject, for I find that the text-books are very indifferent in regard to it. My own observations lead me to believe that the causes of retroversion are the loss of support from morbid states of the uterine ligaments occuring while the pelvic floor remains normal or not wholly useless as a means of support, and that prolapsus is due to defects in the uterine supports and loss of the pelvic floor also. This may be stated in another way, which will show what this view is based upon. In the great majority of cases of retroversion which I have seen, the pelvic floor has not been wholly wanting, in fact, in some of the cases it has been quite normal; while in prolapsus it is usually defective. It will be easily understood that when the supports of the uterus are defective, especially the anterior ligaments, and the vagina and pelvic floor are in their normal condition and keep the cervix uteri in place, the tendency would be for the uterus to fall backward into the retroverted position.

Changes in the condition of the cervix uteri and in its relations to the vagina have some influence in the causation of retroversion. In those who have had cellulitis, after confinement, in the tissue around the cervix above the vagina the invagination of the cervix is lessened — indeed, sometimes obliterated.

The vagina to the touch is like a *cul-de-sac*, the entire uterus being above the vagina. This condition favors retroversion. Fig. 149 shows retroversion with imperfect invagination of the cervix uteri in a patient who has had cellulitis.

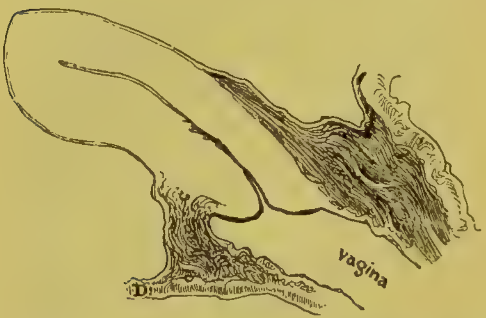


FIG. 149.—Retroversion with imperfect invagination of cervix due to inflammatory products about it.

Laceration of the cervix bilaterally produces a similar condition of imperfect invagination, which is often associated with retroversion. The anterior half of the cervix becomes lost in the anterior vaginal wall, and the posterior part of the cervix is apparently less prominent in the vagina, if not really so. This is more frequently seen where the lateral lacerations extend above the vaginal junction. Fig. 150 shows this condition.

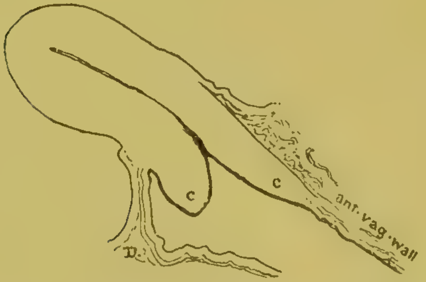


FIG. 150.—Apparent imperfect invagination due to bilateral laceration of cervix: c, c, lips of the cervix.

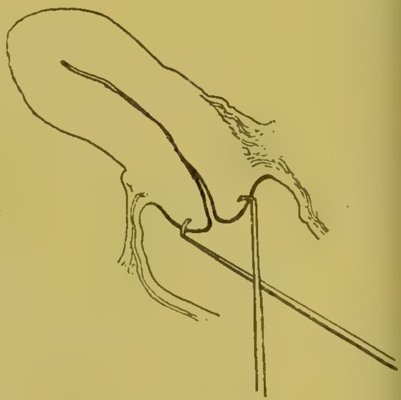


FIG. 151.—The same uterus with its lips drawn back into place by tenacula.

In such cases the state of the cervix has much to do with keeping up the retroversion, as well as causing it. This I have demonstrated by trying to keep the uterus in place before restoring the cervix, and finding it very difficult, while it was quite easy to do so after the cervix was restored. The immediate effect of operating was to bring the cervix prominently into the vagina and sustain it there. Fig. 151 shows the change effected in the case represented in Fig. 150, after the restoration of the cervix and before restoring the retroversion.

Further evidence is also obtained to show that these mal-relations of the vagina and cervix, just mentioned, favor retroversion of the uterus, in the fact that in those cases in which the cervix has been amputated the uterus is generally retroverted.

These points I consider to be of much importance and of special interest because they are not, so far as I know, discussed in medical works with reference to the causation of retroversion of the uterus.

Treatment.—The indications are, to replace the uterus and keep it there, and, by so doing, the supports of the uterus may regain their normal condition and complete relief follow. The methods of replacing the retroverted uterus are to place the patient on the left side, and through Sims's speculum to raise the body of the uterus up with two sponges in holders, used as in Fig. 152.

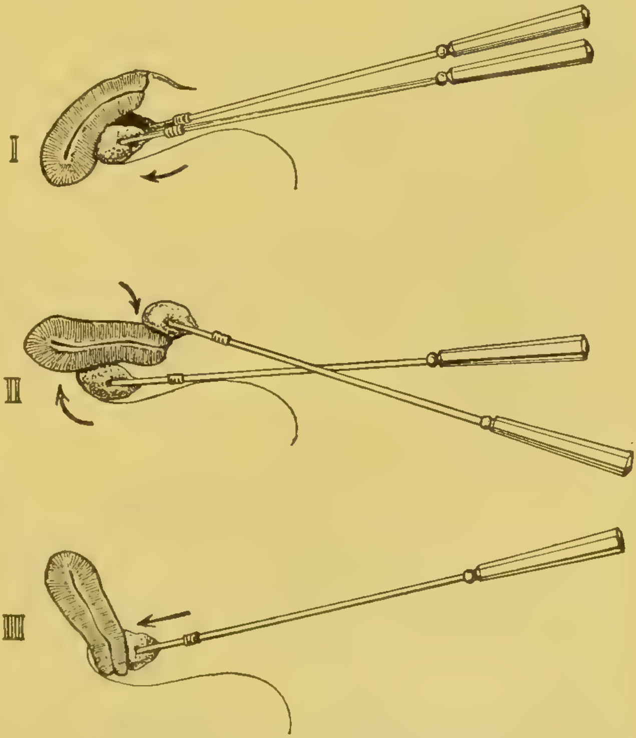


FIG. 152.—The three steps in replacing the retroverted uterus by means of sponge-holders.

By upward pressure the uterus can be raised as far as need be, or as far as possible, and then one of the sponges should be withdrawn or placed in front of the cervix, and backward pressure made there. This helps to complete the replacement, and at the same time holds the uterus in place, while the sponge is removed from its position behind the uterus.

To succeed in this operation, it is necessary to have the bladder empty, and that the patient should not resist the efforts of the surgeon to replace the uterus. When there is any difficulty met in the practice of the method described, the patient should be placed in the knee-chest position (see Fig. 156), and the Sims's speculum used. This alone is sufficient in some cases to effect replacement. When it does not do so, the upward pressure of the sponges behind, or drawing the cervix back with a tenaculum, will accomplish the object, or both sponge and tenaculum may be used.

It is sometimes difficult to replace the uterus in cases of long standing, owing to the contraction of the posterior vaginal wall. The changes in the parts which have taken place to accommodate the malposition, can not always be immediately overcome. In such cases all that can be accomplished is to raise the uterus as far toward its normal place as possible, and then hold it there by means of a temporary support. By the use of the cotton tampon or a pessary, all that is gained by the first and succeeding efforts to replace the uterus is kept, and if the pessary is used properly it will make continuous upward pressure upon the fundus uteri, and thereby constantly gain more and more. In cases of long standing the displacement becomes completed by slow degrees, as the tissue changes in the support of the uterus and vagina have taken place as the result of long-continued influences, and they can not be abruptly rectified. It takes time to undo that which it has required months and years to do; hence, the process of restoration must be accomplished by degrees and by repeated efforts. The details of this method of treatment will be given in the clinical histories of cases to be related hereafter.

The next object to be attained is to keep the uterus in position. This raises the question of the mechanical supports of the uterus. I think that Dr. Frank P. Foster, of New York, has given the most rational discussion of the subject that I have seen, and I will quote his views later on.

THE TREATMENT OF RETROVERSION BY THE USE OF PESSARIES.

There are a great many kinds of pessaries employed in treating retroversion of the uterus. A few of them can be made to do much good when skillfully employed. The great majority of them are useless, and all of them are capable of doing much harm if used without a clear idea of how they should be used. During a discussion of displacements of the uterus at a meeting of the American Gynecological Society held in Boston, in 1877, Dr. E. R. Peaslee expressed himself in favor of the use of pessaries, claiming, at the same time, to have obtained very gratifying results from their use in his own practice. In the same discussion, Dr. W. L. Atlee said: "I have had no experience with pessaries, at least with their introduction, but I have had a very long experience with their removal. I do not think that there is a day when I am at home and in my office, that I do not have the privilege of taking out a pessary. I have removed pessaries of all forms and sizes, and pessaries introduced by the most distinguished men of the profession." Peaslee and Atlee were certainly two members of the profession of this country, equally distinguished in ability, profound judgment, and thorough honesty, and why they should hold such opposing views upon a subject so practical may not be capable of explanation by any one. It has appeared to me, however, that the one came to his conclusions from a careful investigation of the utility of pessaries when properly used, while the other based his opinions upon the fact that as generally employed, pessaries do very great harm. Viewing the subjects from these two stand-points, both conclusions are perfectly rational, and ample proof may easily be obtained of the good and evil which come from the use of these instruments.

At the present day, I presume that if the harm done should be placed opposite the good accomplished by all the pessaries in use, the results would be about equally balanced. It follows, then, that as matters stand at this moment, it is a question whether the human race would be better or worse if all the pessaries were put out of existence.

The all-important fact remains, however, that pessaries are of great value, and capable of giving relief to those who suffer from some of the forms of uterine displacements, if properly used. The same may be said of nearly all valuable agents employed for the relief of suffering. That any agent, capable of giving relief when skillfully employed, is likely to be as potent for evil when misused, is a well-known fact; hence, the object should be to attain to a more perfect and general knowledge of how to make and use pessaries in order to promote the good results, and lessen the evil.

There are many difficulties which naturally arise in the investigation of the use of pessaries. Not only do authorities differ very widely in their views regarding their use, but one's own experience is oftentimes misleading. For example, a pessary may be used to correct a displacement, and marked relief is obtained. The patient testifies to the fact that her symptoms are relieved and her usefulness extended while wearing a pessary, and yet that instrument may be doing harm by still further damaging the supports of the uterus.

These may appear like contradictory statements, and yet such are the facts observed many times in practice. The same thing is seen in the abuse of corsets. The lady who has contracted her waist by tight lacing suffers great discomfort when she goes without corsets, and is relieved by wearing them, and yet no one doubts the fact that great injury is caused by this article of wearing-apparel.

The mechanical action of pessaries must necessarily be clearly understood in order that they may be employed with favorable results; misunderstanding on this point is no doubt the cause of much unsatisfactory practice. Judging from the many errors made in the use of pessaries, as seen in practice and from the various opinions expressed by writers, I am fully satisfied that this part of the subject is not as clearly understood as it should be by the profession generally. My own views are so fully in accord with those of Dr. Foster, that I shall quote his article:

"It can not be said that opinions are wholly agreed as to the way in which vaginal pessaries most commonly effect changes in the situation, form, and attitude of the uterus. Those who have given any considerable amount of thought to the matter will probably admit (1) that a pessary may operate by virtue of mere lateral distention of the vagina, being itself too bulky to escape readily from the pelvic outlet, and thus preventing the parts resting upon it from so escaping; (2) that the pressure exerted by a pessary may be transmitted directly to the body of the uterus, lifting it up when anteverted or retroverted, as the case may be; and (3) that such pressure may operate by dragging the lower portion of the organ in a certain direction, thus causing its upper portion to move in the opposite direction.

"While there can scarcely be a doubt that each one of these methods of action may explain the work done by pessaries under certain circumstances, it may be not only interesting as a mere matter of curiosity, but profitable as tending to greater precision in practice, to inquire into the relative frequency with which the one or the other actually operates, which of them is therefore of the greater practical importance, and which of them should be specially emphasized in teaching. The question as to whether certain pessaries act as levers, or whether they are merely forced bodily in a certain direction, and so fulfill their purpose, is quite foreign to this inquiry, and, therefore, I shall not enter upon its considerations.

"In regard to the method of action first mentioned—that of lateral or transverse distention of the vagina—it may simply be said to apply only to special forms of pessaries, which, although in common use before Hodge's time, have now almost fallen into disuse—deservedly, I may be allowed to add.

"The second method, that of pressure transmitted directly to the body of the uterus, is undoubtedly the one that is most prominent in men's minds, most taken into account in practice, and most appealed to in teaching. And yet, it seems to me, its scope is really quite limited, and its practical importance almost nil. If an extreme malposture of the uterus is corrected by the act of inserting a pessary adapted to the case, as may often enough be done, the instrument may act at first, I admit, by direct transmission of its pressure to the body of the organ lifting the latter from a state of extreme anteversion or retroversion, as the case may be. But such action is only momentary; long before it could restore the uterus to its normal attitude another agency is called into play, so that when the full action of the pessary is attained, its pressure is no longer transmitted to the body of the organ. In any case, then, this direct action on the body of the uterus is of but momentary duration, and accomplishes but a partial result; and, if the malposture is not originally very decided, or if it is corrected before the instrument is inserted into the vagina, it does not come into play at all.

"These statements embody no novelty, but they are so at variance with the views that seem to be held by the most influential teachers of gynecology, that it seems best to put forward some reasons for them. To illustrate, then, suppose a case of retroversion. In order that a pessary may fully restore the uterus to its normal attitude, and hold it in such attitude (acting all the time by direct pressure on the body of the organ), its pressure must be exerted not only upward, but forward, and that, too, at a point situated high in the pelvis. Now, from my own experience, from observation of the practice of others, and from the drawings employed by authors to illustrate the action of pessaries, I believe that pessaries long enough to fulfill these conditions are seldom if ever used. Granting, however, that I may be mistaken in this respect, it will scarcely be disputed that either such a pessary, besides being very long, must have a very pronounced curve in order to enable its middle portion to lie wholly below the face of the cervix while its upper end exerts the pressure in question (in which case its introduction, supposing the perinæum to be intact, would be well-nigh impossible); or else its limbs must diverge to such an extent as to accommodate the cervix between them, making the instrument very broad, in which case it would not pass between the two utero-sacral ligaments without stretching them apart to such a degree as practically to shorten them, thus causing them to pull the lower portion of the uterus backward, and consequently throw its upper portion forward. The result of this latter state of things would be that the retroversion would be corrected before the upper end of the instrument had been forced high enough to restore the body of the uterus to its normal position by direct pressure upon it, or by pressure directly transmitted to it. Further than this, I believe that in the great majority of instances the mere upward and backward pressure upon the posterior vault of the vagina would suffice to drag the cervix backward in the same way before the instrument had penetrated at all into the space included between the utero-sacral ligaments. This, however, would depend upon the degree of tonicity with which the vagina was endowed.

"With regard to anteversion the case is even stronger, while at the same time it is simpler, for the anterior wall of the vagina is naturally tense, and its tension is usually heightened by the mere fact of the uterus being in a state of anteversion. In this tense condition of the anterior vaginal wall we have a marked contrast with the posterior wall; the latter is much longer than a straight line drawn between its two extremities, and its lower end is connected with parts that are comparatively mobile; the former is firmly attached to the pubic arch. By reason of this tension of the anterior wall of the vagina, its virtual shortening occurs almost at once whenever any noteworthy pressure is made upon it: hence, any of the various forms of anteversion pessaries that are supposed to act by lifting the body of the uterus directly up, really accomplish its ascent by stretching the anterior wall of the vagina, and thus dragging the cervix forward. In proof of this statement, witness the insignificant size of the anterior projections of these instruments—projections utterly incapable of reaching to the height that they would have to reach in order to make direct pressure upon the body of the uterus, even with the bladder intervening, when the organ had approached anywhere near its normal position. The great sensitiveness of the anterior vaginal wall to pressure, the well-known liability of ulceration to occur upon it under the pressure of a pessary, both point to its greater tension as compared with the posterior wall.

"Passing now to the third of the various methods of action that I have attributed to pessaries—that of traction upon the lower portion of the uterus—but little need be said about it, for the considerations brought forward to show the limited scope of the direct-pressure theory, all conspire to advance the traction theory to the most important position. Such I believe it ought to occupy, unless the statements I have put forth are shown to be erroneous. I will simply add that always in anteversion, and usually in retroversion, it is through the medium of the vaginal wall, in my opinion, that pessaries make traction upon the cervix.

"I will briefly mention some of the practical applications of the doctrine I have sought to uphold. In cases of retroversion it is usually sufficient if pessaries are to be used at all, to employ an instrument simply with the idea of making backward pressure upon the posterior wall of the vagina, directing the pressure somewhat upward, unless there are special reasons for not doing so, but not resorting to pessaries with such an exaggerated pelvic curve as to render their introduction difficult. If the instrument is curved rather sharply at a point very near its upper end, the pressure will be distributed more evenly over the posterior vault of the vagina, and, therefore, will be borne better.

"The usual forms of retroversion pessaries (the Hodge instrument and its various modifications, including those with external support) seem to me to act in this way, and to be as unobjectionable as any we are likely to hit upon. More or less stretching of the posterior vault of the vagina is apt to result, but it is of little consequence even should it prove permanent, for it in no wise interferes with the natural functions of the parts. Broad pessaries, penetrating between the utero-sacral ligaments, should never be used, for these ligaments form a part of the mechanism by which the normal situation and attitude of the uterus are maintained, and anything that stretches and relaxes them interferes with the permanent cure of retroversion."

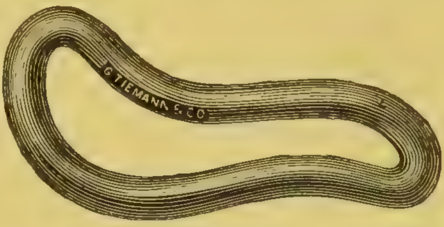


Fig. 153.—Albert Smith pessary.

ADAPTATION OF PESSARIES.

The adaptation of pessaries for the relief of retroversion, is facilitated by keeping in mind the object to be accomplished, and the way in which the instrument acts in fulfilling these requirements. All that remains, then, is to shape the pessary to the case in hand, and to place it in position after the uterus has been restored to its place. This is an easy or difficult task, according to the artistic and mechanical skill of the surgeon. Badly-adjusted pessaries are not so common as badly-fitting shoes and clothes, because they are not so generally used. No one who is destitute of some knowledge and skill in mechanics, will ever succeed in the treatment of displacements of the uterus by means of mechanical supports. The gravest errors are committed every day by using pessaries without understanding the principle of their action or the methods of adapting them. This lack of knowledge and of the required ability lead to the too frequent use of certain kinds of pessaries known by the names of their inventors. The prevailing idea being that a certain form of pessary recommended by some one in authority will answer for all cases, a slight variation in size being all that is necessary. This is certainly a great mistake. The only pessary which can be of service is one that is correctly adjusted to the patient who is to wear it; not a ready-made one with a distinguished name and reputation. An abundant experience, so far as seeing and treating many cases goes, and some practical knowledge of the mechanical art, enables me to say, that no two cases of displacement are alike, and, therefore, each one must be fitted with a pessary of the special form and size required. This really simplifies practice greatly, because it enables one to reject the vast number and variety of ready-made pessaries in the market, and to choose the simplest forms and adapt them according to certain principles and the requirements of cases. In the books there is no end to the number of instruments commended, and the directions to introduce and remove them are ample and sufficient, but there is a conspicuous absence of any definite and useful directions regarding the manner in which such instruments are to be fitted.

In the simpler cases when the uterus can be restored to its position completely, and when thus restored the vaginal walls assume their normal shape, the pessary is easily adapted. The length of the vagina should be obtained from the posterior fornix to a point corresponding to the upper end of the urethra, and the width of the vagina at that part indicated by a line bisecting the center of the cervix uteri should be taken. These measurements give the size of the pessary required in length and width, and are usually taken through a Sims's speculum, with the patient on the left side.

The longitudinal measurement is easily obtained by a sponge and holder (Fig. 154), which are carried up by the side of the cervix to the upper termination of the vagina, and there marking, with the finger resting on the stem of the sponge-holder, the point opposite the junction of the bladder and the urethra. The transverse measurement may be taken by sight, or, if the eye is not trained suffi-

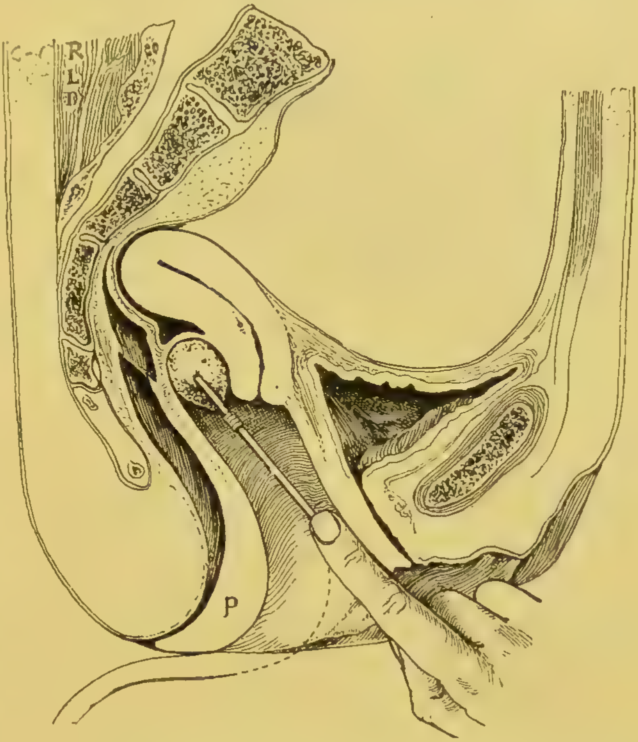


Fig. 154.—The method of measuring the length of the pessary; P, retracted perineal body.

ciently for this, by a pair of long dressing-forceps having a mark on the handles the same distance from the lock as the point of the blades. The forceps are passed up and the blades expanded until they reach the lateral walls of the vagina, and, while held in this position, the measurement is obtained from the extent of separation of the handles. The size being obtained, the shape next demands attention. The outlines of the Albert Smith pessary (Fig. 153), are adapted to the lateral vaginal walls in a general way, and any change to suit special cases is easily made. The curves for the antero-posterior walls are slight modifications of the ogee curve of the mechanic, which is two segments of a circle joined and reversed. This shape may be taken as a basis from which changes of form must be made in every instrument used.

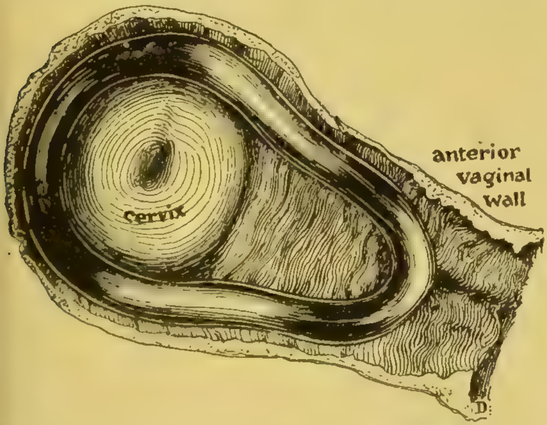


Fig. 155.—Diagram of pessary in situ on looking at it in Sims's position, through Sims's speculum.

The guide for the form of these curves I have obtained in this way: I first ascertain by touch and inspection the length of the invagination of the cervix posteriorly, and then make the posterior upward curve of the pessary a little short of the extent of this in-

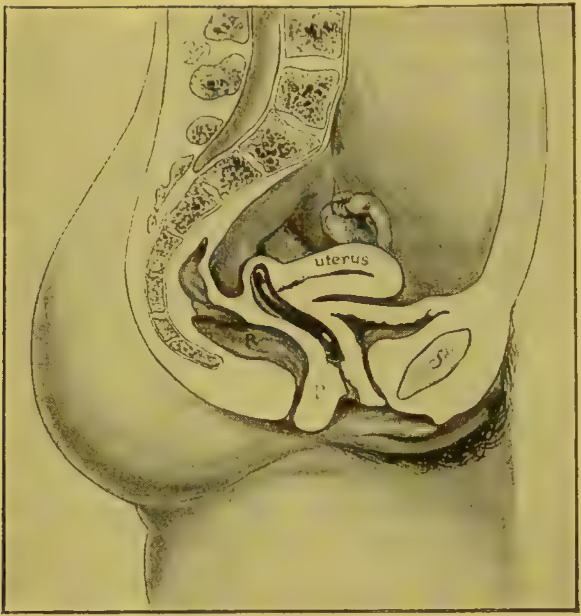


Fig. 156.—Slight invagination of cervix posteriorly with suitable pessary.

vagination. The anterior downward curve is made about equal to the posterior, subject to slight variations to meet special cases.

Figs. 156 and 157 show two cases differing in the extent of invagination, with pessaries adapted to them.

These rules for the adaptation of pessaries are only useful as a basis to start from; each case requires one deviation or more from these rules. This necessitates a material for a pessary which is easily molded, and this is happily now afforded in the instrument made of whalebone and fine copper-wire, and then covered with soft rubber. This kind of a pessary can be modeled with the greatest facility to any form.

To restate briefly the most important points in the management of mechanical supports in the treatment of retroversion, I would say that my method is as follows: Sims's position and his speculum are used in replacing the uterus, and when it is restored the measurements are taken, a pessary selected of the proper size and modeled to suit as nearly as possible. It is then intro-

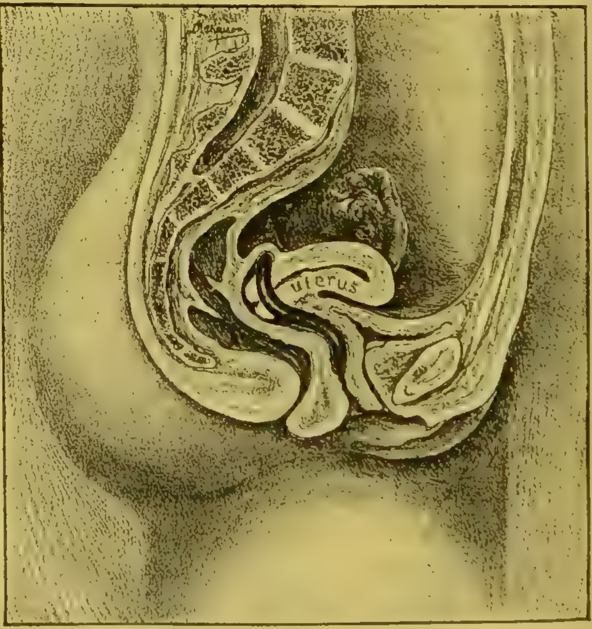


Fig. 157.—Decided invagination of cervix posteriorly fitted with a suitable pessary.

duced and careful observations made to see if it fulfills the requirements. If it does not it is removed, altered, and reapplied, care being taken never to have the instrument large enough to make general pressure on the vaginal walls, nor of such shape that it will make undue pressure at any one point.

Where possible, I prefer to introduce and remove pessaries through Sims's speculum. The method of doing this is very simple. In the introduction the perinæum is retracted, and the pessary turned up on the edge is passed beyond the vulva and then turned half round, which brings it into position.

It is usually the case that, in the treatment of retroversion, the pessary requires to be changed in shape quite frequently during the first two or three weeks that it is in use, but with the material described this is easily done. When the uterus is well in place, and the vagina no longer appears to be undergoing any changes from involution and contraction, then a hard-rubber pessary is made, using the soft one, which has been made to answer the purpose, as a model. The hard rubber, of course, can be worn a much longer time than the soft, and is much more agreeable to the tissues.

In regard to the modifications to be made in pessaries, to suit cases as they present themselves, all that is necessary will be said when giving the histories of cases. It is important, however, to keep in mind what has been said in regard to the cases in which the uterus can not be fully restored to its normal position, owing to changes in the posterior vaginal wall and the uterine ligaments. In such cases the restoration to the normal position must be gradual, and hence the use of the pessary is to keep the uterus in the position in which it is placed by the efforts at restoration, and by the support of the instrument to favor a tendency toward the normal position on the part of the uterus. In the management of such cases the posterior part of the pessary should not be much curved upward, if at all, because the object is to have the pessary carry the posterior vaginal wall backward behind and below the uterus to support the body and fundus, while the cervix resting between the bars of the pessary is unsupported and free to sink downward and backward as the body of the uterus rises. Here the principle of the lever acts to change the axis of the uterus. This is shown in Figs. 159 and 160.

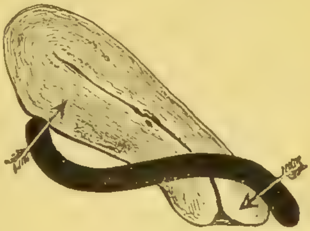


FIG. 158.—What the pessary does not do.

The lever action of the pessary is made more effective by the pressure of the bladder and the anterior vaginal wall upon the anterior part of the instrument, which inclines to raise the posterior part upward, and so bring the pessary into a more oblique position as the uterus rises. See Fig. 159.

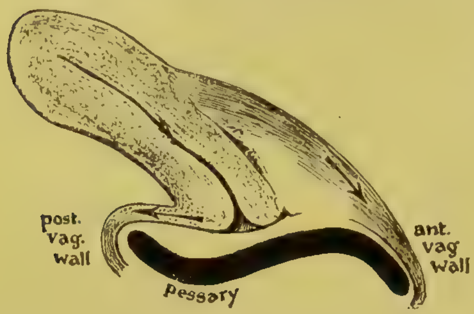


FIG. 159.—How the pessary acts—shown by the arrows in the diagram.

The pessary being wedge-shaped — that is, narrower in front than behind—is held upward by the contraction of the lower portion of the vagina, and the wedge-action helps the lever-action of the pessary to raise the uterus and throw it forward.

In regard to the surgical operations employed in the management of retroversion, I may say that, where the cervix uteri is lacerated, it should be restored, and also that the pelvic floor, if injured, must be operated upon in order to cure retroversion. In fact, very little progress can be made in the treatment of retroversion, unless the pelvic floor and uterus are normal or nearly so.

This is all the surgical treatment that I now employ, besides mechanical support, in the management of these displacements.

Alexander's Operation.—In recent times, Alexander, of Liverpool, has devised a plan for the correction of uterine displacements, which consists in shortening the round ligaments. In his presentation of the subject to the British Gynecological Society, he said that the operation has now been performed in nearly all prominent cities in the world, and by most operators with more uniform success than generally befell any new operation. He never found any difficulty in finding and drawing out the ligaments. An incision was to be made upward and outward from the pubic spine, in the direction of the inguinal canal, for one and a half to two or three inches, according to the fatness of the subject. A considerable thickness of subcutaneous fat was then met with, which must be cut through by subsequent incisions, until the pearly, glistening tendon of the external oblique muscle was reached. Midway through the fatty tissue an aponeurosis sometimes appeared, so firm and smooth that it might cause the operator to think he was deep enough, but he would find no liga-

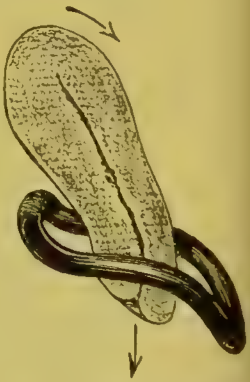


FIG. 160.—Second step: the uterus falls into the pessary.

ments at this spot. The first stage of the operation consisted simply in cutting down upon the tendon of the external oblique muscle, until it appeared clean and shining at the bottom of the wound.

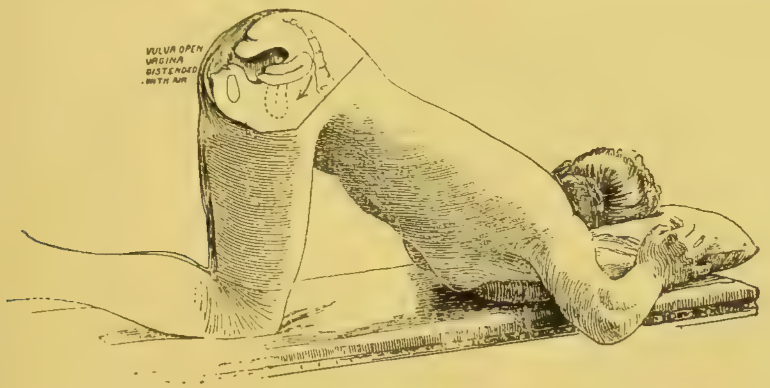


FIG. 161.—The knee-chest position—air enters the vulva, and distends the vagina, and the fundus falls in the direction of the arrow.

The external ring was then found. The finger passed to the bottom of the wound detected the spine and the ring outside. Having isolated the external wound, and tied any little vessels, the next step was to find the end of the ligament. By everting all the structures upward, the round ligament could be seen, generally at the lowest part, and with the white easily distinguished genital branch of the genito-crural nerve along its anterior surface and close to it. The ligament at this stage was more or less rounded in shape. It was an easily recognized flesh-colored structure. When the ligament was identified, the small nerve on its surface was to be cut through without dividing any of the ligament. Then gentle traction was to be made, either by the fingers or by broad, blunt-pointed forceps. Bands holding it to neighboring structures were cut through with cissors. As soon as it began to peel out, it was left, and the oppoite side begun. The final stage of the operation consisted in placing he uterus in position by the sound, and pulling out the ligaments ntil they were felt to control that position. A curved threaded eedle, with fine catgut, was used to stitch each ligament to both illars of the ring and the external abdominal ring was closed withut strangulating the ligament as it lay between them. The ends of he ligaments were now cut off, and the remainder stitched into the ound by means of the sutures that closed the incision. A fine rainage-tube was inserted, and the wound washed out with carbolic r other lotion before these sutures were tied.

The after-treatment consisted in rest. The tubes were removed on the second day, when the wound was dressed. The mortality of the operation might be set down as nothing. Three deaths had occurred, but they were due to preventable causes. As mortality did not seriously enter into any consideration of the results of this operation, the real question at issue was whether it fulfilled the intentions of the operator and satisfied the expectations of the patient. The operation was designed to correct certain uterine displacements, and these alone. Whether the discomfort of the patient would be thereby relieved, entirely depended on whether or not the symptoms were due to the displacement. To secure success the operation must be properly performed, and the after-treatment must be rational, so that no strain might be placed on the ligaments until sound union had taken place.

Most excellent results from this operation have been reported by many surgeons. I have not practiced it very often, for the reason that most cases are curable by the means which I have described, and the cases that are incurable by such means are also incurable by Alexander's operation.

In estimating the merits of any surgical procedure one must always bear in mind its disadvantages. I especially call attention to this subject because we hear enough about the success of Alexander's operation and not enough, perhaps, of limitations of its usefulness, if we rely for all our information upon the strongest advocates of this treatment of retro-displacements of the uterus.

During my investigations of retro-displacements of the uterus I found the round ligaments defective in some cases. This led me to the conclusion, early in my teaching days, that atrophy or imperfect development of this ligament was a frequent cause of backward dislocations of the uterus. I have also found that retroflexion occurring among nullipara was sometimes accompanied with a defect in the round ligaments, due, I presume, to a lack of development. In those who had acquired retroversion or flexion, I presume, the defect was due to atrophy.

Recently I have seen two cases that fully illustrate the point in question. One was a married lady about thirty years of age who had borne two children. For six years she had suffered from a retroflexion of the uterus. For two years she had been tormented with a painful left ovary. She had been treated by several practitioners during the six years before coming to me. Finding it impossible to keep the uterus in place by any support, I determined at once to do a temporary ventral fixation of the uterus. In my bimanual examination I could not feel the round ligaments, and on direct inspection, after opening the abdomen, no trace of them could be found. I subsequently removed the uterus and ovaries at my clinic, and no evidence of the presence of round ligaments could be found. This case was a very fortunate one for investigation. Between the folds of the peritonæum where this ligament should be found there was nothing but areolar tissue. These two cases were much the same as others that I have examined heretofore.

I have consulted with my associates on this subject and have found that their experiences coincide with my own. I have asked Prof. Browning, Professor of Anatomy at the Long Island College Hospital, about this ligament, and he has told me that he finds it ill defined in some of his subjects, and so difficult to demonstrate to his classes that he often ignores it altogether. Dr. Lewis, formerly Professor of Anatomy, and Dr. F. H. Colton, at one time Demonstrator of Anatomy, give me the same account of their observations regarding this ligament.

I have observed that in cases of retroversion the round ligament is at first stretched, and then atrophy begins first in the middle of the ligament and becomes complete there, while the uterine and abdominal ends are the last to give way. This explains the fact that in doing Alexander's operation the end of the ligaments is sometimes found in the inguinal ring fairly well developed, while there is not a trace of it left in the abdominal cavity except within an inch of the uterus, where a few fibers may or may not be found. Further confirmation of this opinion has been obtained in having seen expert surgeons of large experience fail to find the round ligament in a most careful dissection. This, I presume, is a reasonable explanation of the failures that occasionally come to light.

There is still another objection to Alexander's operation, namely, that hernia follows in a number of cases. I am fully satisfied that, no matter how carefully one may do an Alexander's operation, the abdominal wall is sometimes weakened at the point where the incision is made and the patient is predisposed to hernia. There is no trouble immediately after the operation, but in after years when the scar tissue is absorbed the wall of the abdomen is weakened and hernia is likely to follow, and it does occur in some cases. I have seen three patients who had hernia following this operation. These cases having been operated upon by experts and having such results compel me to believe that there are many others, for it is hardly possible that all the cases with imperfect results should have come under my observation.

The advocates of this operation claim that it has one great advantage that I have not referred to, and that is, the short time required to cure displacements in this way. I have never found that patients saved time or money by Alexander's operation, if they were curable in the old way. In treating a retroversion the patient is under observation longer, but she is not so long off duty as in undergoing Alexander's operation, and hence does not lose as much time. To the surgeon who likes to operate and does not very well understand other ways of treating displacements, this operation has a wide range of application, and is popular with patients who like to be cured quickly. Still, in all this I find no good reason for modifying my opinion regarding the indication for the employment of Alexander's operation.

I am fully satisfied that this operation is valuable, but limited in its usefulness. I now employ it in one class of cases, namely, retroversion or retroflexion accompanied with prolapsus of the ovaries and without adhesions. In such cases the uterus can be restored to its normal position, but can not be held there by mechanical support, owing to the ovaries being in the way. Such cases are incurable by the old method of replacement and support, but are promptly relieved by Alexander's operation, providing the round ligaments are all right. To this extent I indorse this operation in the cases referred to, and commend it as a most valuable procedure. It has been brought into disfavor, like many other good things, by being overdone.

Ventral Fixation.—This is the name given by Sanger to the operation of fixing the fundus uteri to the abdominal wall. Kelly called it hysterorrhaphy, and later has used the term ventral suspension, but I like the first name best, as it is most comprehensive. The indications for this form of surgical treatment are retroversion or retroflexion complicated with adhesions, atrophy at the junction of the body and cervix, or disease of the ovaries that require ovariotomy. The operation was first performed by Koeberle, as follows: Having had occasion to remove an ovary and tumor, he fixed the stump in the abdominal wound. This is known as the indirect method, and having been found defective has been abandoned, I believe, in favor of the direct method—that is, stitching the uterus directly to the abdominal wall. A number of different ways of doing this fixation have been practiced by various surgeons. Some vivified the peritonæum at the points to be united by scraping; others omitted this. Various ways of introducing the sutures have been practiced. Pozzi's method is the simplest, and as efficient as any. He uses a continuous suture, which he passes through the muscular layer and peritonæum of the abdominal wall and through the peritonæum. The rest of the abdominal wall is closed in the usual way. He uses fine silk. I prefer chromicized catgut.

Operating in this way the fixation is permanent, at least it remains for a long time, and hence I have looked upon this procedure as objectionable, first, because it is an abnormal condition, and on theoretical grounds it is not good surgery to produce one morbid state to cure another if it can be avoided ; and, in the second place, this fixation of an organ that should be movable quite often causes suffering as bad as, or worse, than the displacement.

For these reasons I have not been fully satisfied with this ventral fixation described in the books and practiced by surgeons generally. I have therefore made the fixations so delicate that in time they give way and leave the uterus free, as it should be. The way of doing this operation is very simple in principle, but requires considerable skill and care to do it well. The object is to fasten the utero-ovarian ligaments (at their junction with the uterus) to the inner side of the abdominal wall with a chromicized catgut suture. Adhesions are formed between the surfaces thus held together that are strong enough to hold the uterus in place for a while, but will give way in the course of time. During the period of fixation the natural sup-

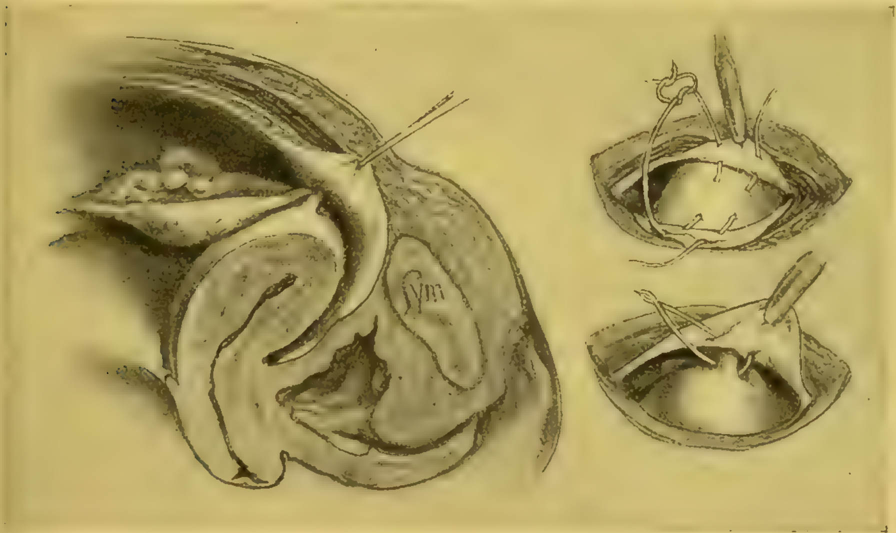


FIG. 162.—Ventral suspension. The uterus is swung to the peritonæum of the anterior abdominal wall by sutures passed under the utero-ovarian ligaments. To the right, beneath, is shown the incision, with one stitch ready for tying ; above this, the usual method of passing the stitches through the peritonæum of the fundus. (From photographs of a cadaver.)

ports of the uterus regain their strength and hold the organ in place after the artificial fixation has given way. Much care is necessary in selecting the place upon the peritoneal surface where the sutures should be introduced. First, one should measure the width of the uterus at the point where the sutures are to be introduced, and a little more than half of that represents the distance that each suture should be from the median-line incision; then the distance from the pubic bones upward to where the lower part of the suture should be, about the thickness of the uterus, plus three quarters of an inch from the pubes. This is difficult to illustrate, but Fig. 162 may help to make the description more clear.

The uterus should be supported with a properly adapted pessary, and the cervix kept in proper position until union is completed. In fact, I have deemed it advisable to keep the pessary in position for two months, in order to prevent a recurrence of the displacement when the ventral fixation gives way. With this kind of after-care my cases have remained well. That is more than I can say of permanent fixation, for all the cases occurring in my own practice and seen in the practice of others have suffered less or more when the uterus remained firmly fixed to the abdominal wall.

This includes all the surgical treatment of retro-displacements of the uterus that I have found necessary to relieve curable cases.

Some other surgical procedures have been tried, but so far as I can discover they possess no advantages over the operations already described. Neither have they been adopted by the profession generally. Dr. William R. Pryor unites the uterus to the bladder by scarification and sutures. I quote the following description of his operation:

"The patient being in Trendelenburg's position, the incision should be carried well down to the pubic articulation. For suture material I would not use silkworm gut because of its permanency, but silk or catgut. The bladder should be empty. The anterior surface of the uterus from its bladder junction to the level of the tubal openings should be scarified in the middle for a width of half an inch. Beginning at a point from the posterior border of the symphysis not greater than an inch, the peritoneal surface of the bladder should also be gently scarified for a space equal to and opposite that on the uterus. The scarification on both bladder and uterus should be so done as to cause no bleeding. Even though the dimensions of the bladder be greater than those of the uterus, so as to necessarily leave a portion of the bladder undenuded, it matters not. But as the contracted bladder about equals the uterus in length, it will not often happen that much surface on the bladder will be left unscarified. The suture should then be introduced with a curved needle without cutting edge. Three or four sutures at most will suffice. These are to be all passed under the bladder peritonæum first, and then the lowest suture under the uterine serosa, and tied to one side. The same with the other sutures in turn. About half an inch apart will suffice to secure accurate coaptation. The sutures are tied in a flat knot and the ends cut short. The abdominal wound is closed in the usual way."

Shortening the round ligaments within the peritoneal cavity has been practiced by A. Palmer Dudley, Polk, Mann, Wylie, and Bode. The former two gentlemen unite the round ligaments in front of the uterus by first vivifying the peritonæum and then introducing one or more sutures. One very objectionable result in this operation is that the Fallopian tube is bent at an acute angle to the uterus so that it is liable to be occluded at that point.

The latter surgeons fold the round ligaments upon themselves, and, having scraped the surface brought in contact, unite them with sutures loosely tied.

Many attempts have been made to fix the uterus by the way of the vagina when it could be brought into position. Some of these operations I shall mention here, though I can not recommend them as having any advantages, or even meeting the indications as well as the surgical procedure already described.

Metro-elytrorrhaphy.—Byford united the wall of the cervix uteri to the vaginal wall (in front or behind, according to the displacement) by vivifying the tissues and uniting the parts with sutures. According to Pozzi, Doleris practiced pre- or retro-cervical colporrhaphy, but I have not discovered that the results were satisfactory.

Pelvic Colpo-hysteropaxy.—This is the name given by Pozzi to Freund's operation, which consists in opening through the posterior vaginal wall into the sac of Douglas and suturing the supra-vaginal portion of the cervix to the peritonæum near the utero-sacral ligaments.

Uniting the Bladder and Uterus by the Way of the Vagina.—Mackenrodt opens the vaginal wall in front of the uterus, and, after dissecting up the peritonæum and opening it, he removes a portion and unites the remainder to the uterus by a continuous suture running from one tube to the other. The bladder wall is then stitched to the uterus. The operation is the same in principle as Dr. W. R. Pryor's, already described.

Shortening the Round Ligaments through the Vagina.—Winter and Schauta opened into the peritonæum through the vagina between the uterus and vagina, and fastening the round ligaments where they are given off from the uterus to a point seven or nine centimetres distant.

Wortheim called this operation the vaginal Alexander method. Vineberg and Polk have practiced this procedure in a modified form.

RETROFLEXION OF THE UTERUS.

In the chapter on anteflexion of the uterus the pathology of flexions generally was discussed, and the classification adopted was that flexion was a deformity and not a simple dislocation. In fact, a very broad distinction was made between displacements and flexions. It was observed at the same time that retroflexion of the uterus was frequently—in fact in the great majority of cases—produced as a result of a retroversion. The uterus first becomes displaced backward, and, in consequence of the deranged forces acting upon the uterus, it becomes bent upon itself—that is, flexed as well as displaced. Owing to this close association of retroversion and retroflexion, and the fact that the treatment of both has much in common, I have placed them together.

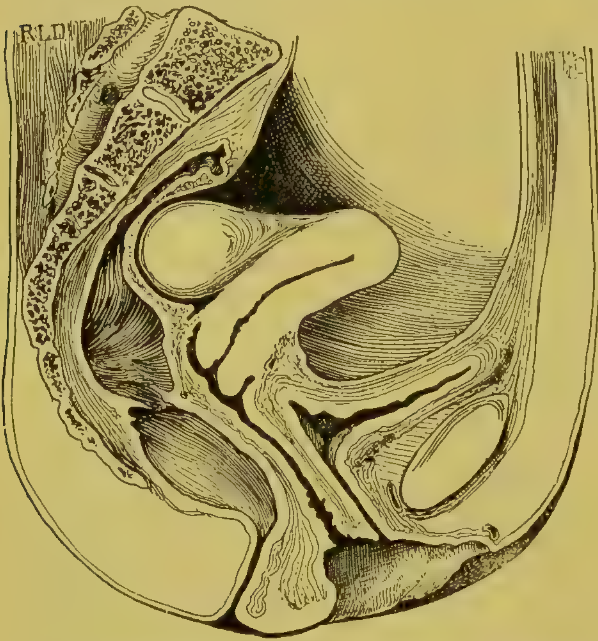


FIG. 163.—Fibroid on posterior wall of uterus simulating retroflexion.

In practice I have made out two degrees of retroflexion, and the flexion is confined to the body, the cervix maintaining its normal relations to the vagina. At all events, the cervix is never bent backward.

Pathology.—This is the same as in anteflexion, so far as the uterus is concerned. There is a want of sufficient tissue at the junction of the cervix and body of the uterus, the point where the flexion occurs. In the majority of cases the cervix and upper part of the vagina are farther forward in the pelvis than they should be, and the cervix points forward more than it should, but less so than in retroversion. This gives rise to a little shortening of the anterior vaginal wall, or else an undue invagination of the anterior wall of the cervix.

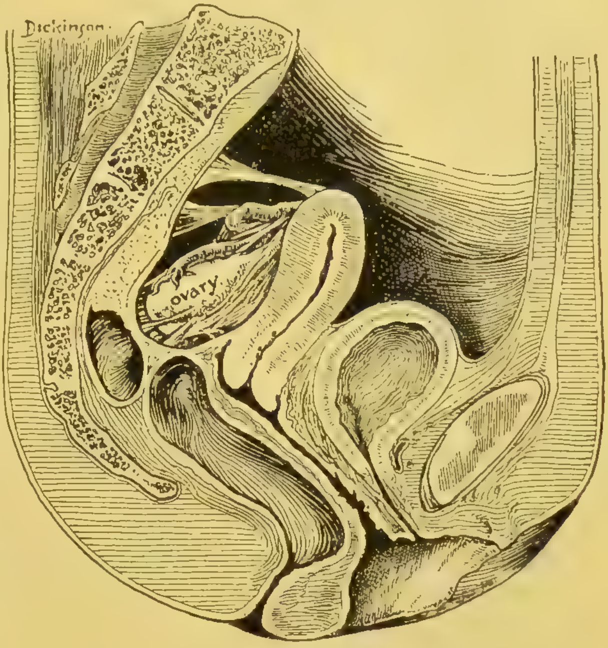


FIG. 164.—Prolapsed and adherent ovary simulating retroflexion.

Symptomatology.—The symptoms present in retroflexion are very much the same as those of retroversion, hence it is only necessary here to note some few that are more marked in flexion than in version. In retroflexion the menstrual function is more frequently disturbed. Dysmenorrhœa is often present, and although the pains are less acute than in anteflexion, they are far more marked than in retroversion. In many of those having retroflexion the menstrual discharge is often quite offensive; this also occurs in other conditions, but, taken in connection with other signs and symptoms, it is valuable as a means of diagnosis in this affection.

Physical Signs.—The points of difference between retroflexion and retroversion are, as observed by the touch, that the cervix in flexion does not point toward the vulva or pubes, but is nearly in its normal position. There is less relaxation of structure of the upper portion of the vagina. Behind the cervix the rounded fundus can be felt by the examining finger to be pointing downward and backward, instead of directly backward as in retroversion. Between the cervix in the vagina and the fundus uteri the angle of flexion can be felt. All this can be made out by the vaginal touch, and in favorable cases the bimanual examination will help to verify the signs obtained.

When the abdominal muscles are very lax and the vagina long and elastic the uterus can be carried upward with the finger which is in the vagina, and brought within reach of the hand on the abdomen—i. e., the uterus can be grasped and examined bimanually. In that case the deformity of the uterus can be clearly made out; but it is rare that this is practicable. It is usually impossible to reach the anterior wall of the uterus by the hand placed upon the abdominal muscles. In the great majority of cases I have been obliged to depend upon the vaginal touch and the uterine sound to make a positive diagnosis.

The two conditions which I have found simulating the physical signs are a large and prolapsed ovary and a subperitoneal fibroma on the posterior wall of the uterus. These are shown in Figs. 163 and 164.

In either of these affections the touch gives the signs of retroflexion, and it is only by using the sound and proving that the uterus is in its proper position and form that they can be distinguished from flexion. While the sound is not absolutely necessary to differentiate between retroflexion and such conditions as those named, I find that it gives confidence in the diagnosis in retroflexion to pass it and see that the canal runs backward and is not distorted by the flexion.

Sometimes it is very difficult to pass the sound around the point of flexion, and in order to do so it may be necessary to raise the fundus and also the cervix, in order to straighten the canal. When the uterus is very tender, much care should be exercised in using the sound. The application of cocaine is useful in relieving the hyperæsthesia.

Causation.—Retroflexion occurs in single women, and also in those who have borne children. In the former I have found it much more frequently. For practical purposes, this affection might be divided as regards causation into two forms, congenital and acquired. From the history of those cases in which this flexion is found in early life, I believe that it is brought about by some lesion of development. It may not be, strictly speaking, a congenital malformation. It is more likely that the infantile uterus becomes retroverted before puberty, and then when secondary development takes place the increase in weight of the body and fundus causes displacement of the upper part of the uterus, and the cervix being held in place by the resistant vagina, the flexion is produced. This is the only explanation of the production of these cases at puberty. When it is acquired after bearing children, I believe that retroversion occurs first, and if the cervix meets resistance from the anterior vaginal wall and bladder in front, the flexion is produced. If the uterus is made to bend a little at the point of flexion, the pressure will cause atrophy at that point, and thereby the flexion will gradually increase.

It is possible that in some of the acquired cases there is some lesion or excess of involution at the junction of the body and cervix, and the walls of the uterus being thus weakened at that point, permit the uterus to fall over backward.

Prognosis.—In acquired cases, and uncomplicated, appropriate treatment will usually give relief if persisted in long enough. In the so-called congenital forms there will be found cases which do not yield to treatment. Relief from the most distressing symptoms may be obtained, but as soon as the mechanical support is removed the flexion will return. The resistance of some cases to treatment I have found due to a rigid state of the posterior wall of the vagina, which prevents the use of a pessary which would extend far enough back to throw the fundus forward. In such cases the use of a pessary often aggravates the trouble.

Treatment.—The principles of treatment in retroflexion are the same as in retroversion, and hence need not be discussed here further than to note some of the additional means necessary in flexion.

To restore the uterus to its normal form and position it is often necessary to use the Elliott adjuster, and to repeat its use a number of times; then a pessary should be employed as in retroversion. In adjusting the pessary care should be taken not to curve the posterior bar too much, but to shape it so that it will carry the posterior vaginal wall back behind the body and fundus so as to support both. This can be made clear, perhaps, by showing the effect of a pessary which is not of proper shape, and which increases the flexion by making pressure upward in place of backward (Fig. 165).

Alexander's operation is suggested to the mind by those cases which do not yield readily to treatment, and I presume it would be useful. However, the only cases which resist the usual treatment are those in which the posterior vaginal wall is unyielding and the uterus can not be straightened by Elliott's adjuster. In such cases there is reason to suppose that the uterus is fixed in its malposition by some old cel-

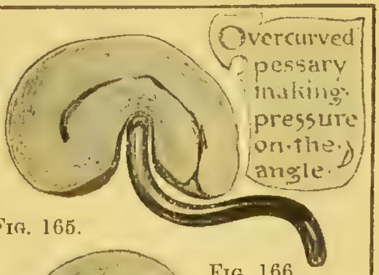


FIG. 165.

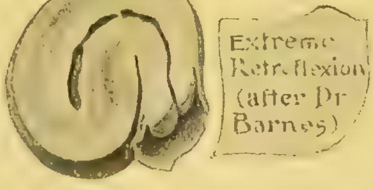


FIG. 166.

lulitis or peritonitis; and, if so, Alexander's operation would not succeed.

It is rather rare that the treatment prescribed fails. In obstinate cases, in which the frequent straightening of the uterus does not stimulate the growth of tissue at the point of flexion, the stem pessary should be tried.

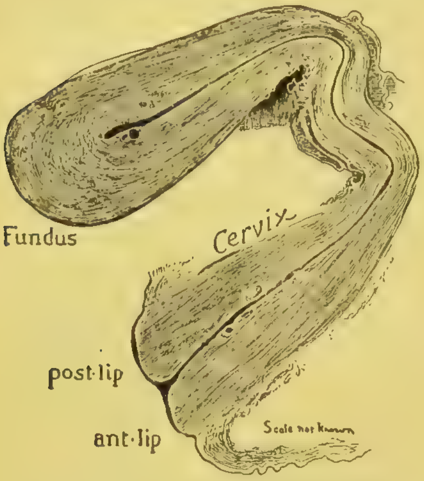


FIG. 167.—Uterus with defective walls; the supra-vaginal portion of the cervix is elongated (after Winckel).

The canal of the cervix should be dilated sufficiently to admit a fair-sized glass or hard-rubber stem. The stem is then introduced to overcome the flexion and keep the uterus straight, and the pessary is used to keep the stem in place. The same kind of stem and pessary as are used in the treatment of anteflexion are employed, with this difference, that the pessary is adapted to keep the uterus in position as well as to hold the stem in place.

To recapitulate, the stem corrects the flexion, and the pessary corrects the retroversion besides keeping the stem in place.

Atrophy of the Uterine Walls at the Junction of the Body and Cervix.—This is a condition which causes anteflexion and retroflexion, which may alternate by turning the body of the uterus backward or forward. I have found it in those who have borne children, and also in those who have not.

Pathology.—There is a defect in the middle layer of the anterior and posterior walls of the uterus at the internal os which permits the uterus to bend forward or backward with equal facility. Fig. 167 shows the appearance of such a uterus. Such cases are rare, and have a clinical history very much the same as anteflexion. I can give the best description of the affection by relating the history of a well-marked case.

ILLUSTRATIVE CASE.

A dressmaker, single, and in fair general health, twenty-seven years old, came under my care in the hospital, giving the following history: She began to menstruate at fifteen, and from that time until she entered the hospital had suffered from dysmenorrhœa. The pain at her periods became progressively worse, until she was entirely unfitted for her duties.

She sought relief in medicine, but only large doses of opium sufficed. Becoming wholly useless, she entered one of the hospitals of this city, and remained under treatment there for four months. During that time she had violent hysterical convulsions at her menstrual periods, and deriving no benefit from treatment was dismissed as incurable. Upon examination, I found marked anteflexion of the body of the uterus, and owing to slight stricture of the internal os and the extreme tenderness of the uterus the sound could not be passed until she was anæsthetized. I then found that the os internum was constricted. I incised it and dilated until I could pass a No. 9 English sound. At the same time I used Elliott's adjuster to straighten the uterus, and carried the fundus backward. This was accomplished with unusual facility, the uterus making no resistance to bending in any direction. The instrument was withdrawn, and the patient placed in bed to rest; there was no pain or inflammation following this treatment. Three days afterward I made a digital examination, and found the uterus retroflexed. By using again the Elliott adjuster I was able to change the retroflexion back to the original anteflexion, which remained so for several days. It being necessary to pass the sound every third day to prevent the recurrence of the stricture at the internal os, I took advantage of the opportunity by changing the flexion a number of times, and found that whatever position I placed the body of the uterus in it would remain there.

The dilatation of the os internum gave the patient great relief from the dysmenorrhœa. The usual treatment for congestion and hyperæsthesia was continued, and the canal kept dilated by the use of the sounds. A stem pessary was tried, but she could not tolerate it except by keeping in bed. She improved so much in two months that she left the hospital, and only returned occasionally as an outpatient. For two years I kept her under observation, and although she was not entirely free from pain she was able to make her living.

In this case I feel sure that the trouble originated in an imperfect growth at the time of secondary development.

In one other case, of which I have full notes, the flexion came after the patient's second confinement, and, perhaps, was due to a derangement of involution.

CHAPTER XIX.

ABUSE OF PESSARIES.

Injuries to the Pelvic Organs Caused by the Improper Use of Pessaries.—The dangers of stem pessaries have already been referred to in the chapter on flexions, so far as their liability to cause acute inflammations of the uterus, pelvic cellular tissue, and peritonæum. There are still other injuries which they may give rise to. When the stem is small and badly adjusted with reference to the character of the flexion, the point of the instrument may become imbedded in the wall of the uterus, or the lower part of the stem may divide the posterior wall of the cervix. Both of these injuries I have seen in practice.

In one case, an anteflexion of the cervix, a small stem of steel with a hard-rubber disk at its end was introduced by a general practitioner, and left in place for three months. The patient soon began to suffer from a purulent discharge, which gradually increased, and there was much pain, greatly aggravated by walking. When I saw her the relations of the stem and uterus were as shown in Fig. 168. After the removal of the stem, the cervix presented exactly the same appearance as that seen after Sims's operation for flexion, except that there was more thickening of the edges of the wound and more inflammation than I have ever before seen after discision of the cervix by the surgeon. The inflammation subsided under ordinary treatment, and she was at least none the worse for having worn the stem.

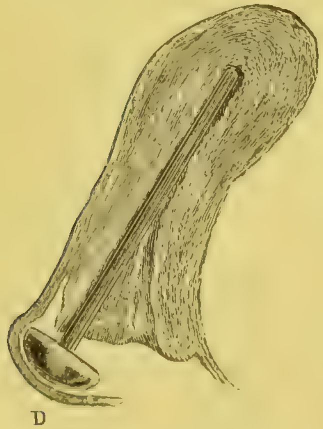


Fig. 168.—Stem of pessary ulcerating through cervix.

Another patient came under my observation while wearing a stem pessary, which had been introduced six weeks before by her medical attendant. She had suffered pain and tenderness from the time that the stem was introduced, and for a week before she came under my care the suffering was so great that she was obliged to stay in bed and take opium freely; she had also a purulent discharge, and at times bleeding.. The stem was about the thickness of a No. 9 catheter. It was made of hard rubber, and was held in place by a cup pessary in the vagina. While the stem was still in place (the vaginal pessary having been removed) the body of the uterus was found to be markedly anteflexed, and its anterior wall near the fundus was unusually prominent, as if it contained a small fibroid tumor.

The flexed shape of the uterus led me to suppose that the stem must be curved, but on removal it proved to be straight.

I then passed with some difficulty, owing to the tenderness of the uterus, a much-curved sound into the cavity of the uterus, and then after straightening the sound, it was passed into the groove made in the posterior wall by the stem. One might suppose that the cavity of the uterus was simply dilated so that the sound could be curved forward and then straightened and passed along the posterior wall, but I am confident that such was not the case. The posterior wall of the body was flexed forward and rested upon the anterior wall on either side, and the sulcus made by the stem was in the center.

Fig. 169 shows the conditions as they appeared to me during my examination.

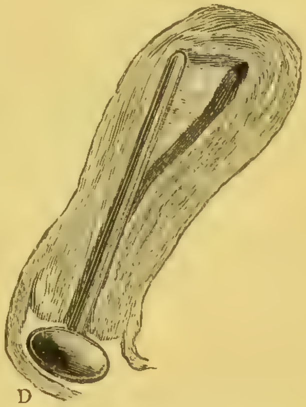


FIG. 169.—Stem cutting through body of uterus.

There was considerable bleeding after the removal of the stem, and the uterus became more flexed apparently as soon as the support was withdrawn. There was relief from the acute symptoms and inflammation caused by the instrument, but the dysmenorrhœa was worse than before.

Atrophy of the muscular tissue of the vaginal walls from overdistention by pessaries that are too large is quite frequently seen. Practitioners who are not skilled in the use of pessaries, yet nevertheless use them, produce this injury of the structures of the vagina. The same unfortunate results are effected by those who believe in the theory that in order to keep the uterus in place, in retroversion, for example, it is necessary to use a pessary large enough and sufficiently curved to force the posterior wall of the vagina far up in the pelvis above its normal elevation.

The following case will illustrate this: The patient had children, and was said to have had a displacement; probably retroversion. She was treated with a variety of pessaries, so she told me, but did not get well; when she came to me, she had much backache, pelvic pain, and vaginal leucorrhœa; she was then wearing a pessary nearly large enough to fill the pelvis, and much curved both in front and behind.

The uterus was in about its proper place in the pelvis, but the vagina was greatly overdistended and its walls were thin, especially the posterior wall behind the cervix. On removing the pessary, a difficult task owing to its size, the vaginal wall, and the rectal wall also, I think, fell downward and formed a rectocele high up.

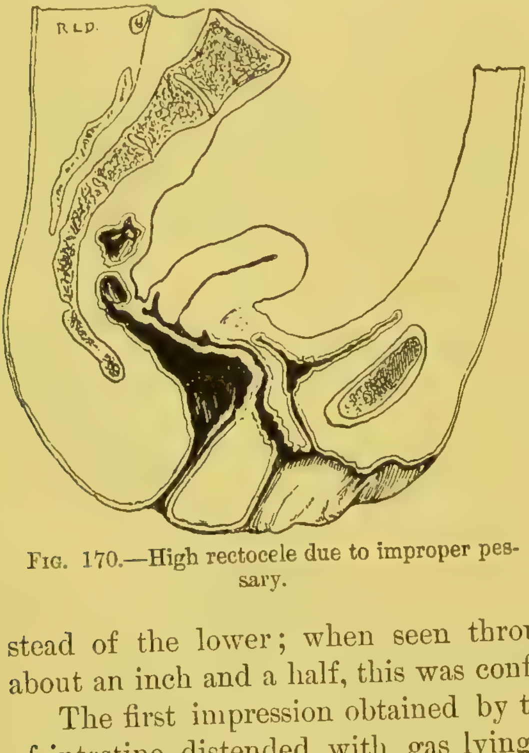


FIG. 170.—High rectocele due to improper pessary.

Fig. 170 will give an idea of the state of the parts as they appeared to the touch, after the pessary was removed.

The part of the thin wall of the vagina bulged downward, and felt to the touch exactly like the ordinary rectocele, except that the protruding mass was at the upper part of the vagina instead of the lower; when seen through the speculum introduced about an inch and a half, this was confirmed by the eye.

The first impression obtained by the touch was that of a portion of intestine distended with gas lying behind and below the cervix uteri. The patient felt a little more distress, strange to say, after the pessary was removed; when she tried to walk without it, she suffered from pain and tenesmus very severely. This I have found to be the case in all instances of overdistention of the vagina; patients suffer with the support, and for a few days suffer more without it.

This is much the same experience as ladies have who can not go without corsets, and the tighter they lace them and the more damage they do, the more they miss them when they discontinue their use.

This patient was kept rather quiet for a time, and astringent injections were used, which, after a long time, restored the vagina more nearly to its normal caliber. There remained for over a year, when I last saw her, and perhaps ever since, a sagging of the upper part of the posterior vaginal wall.

Another case, somewhat of the same character, came to me from the West. She was forty, and single; her health and strength had been good until she was thirty-six years of age, when she began to have a variety of nervous symptoms clearly due to general debility. She was treated by several reputable physicians, but not recovering as fast as she desired, she consulted still another, who told her that she had falling of the womb, which caused all her troubles. There was not a symptom that pointed to any disease or displacement of the sexual organs, but a Cutter pessary was introduced and the patient wore it about two years. Her general health improved very little, and the pessary soon caused her trouble; still she persisted in wearing it because the doctor said she must do so; her condition became so wretched that she came East, in the hope of gaining relief.

When she came to me she had some vaginitis and vulvitis caused by the pessary, but the uterus was perfectly normal in every way. The Cutter pessary had pushed up the posterior vaginal wall far beyond the cervix, which lay on one side of the instrument, not between the bars as it should have done.

The condition of the posterior vaginal wall at the upper part was about the same as in the case just related. The lower part of the vagina was normal, excepting the inflammation caused by the pessary. The vulva was also inflamed, and she suffered greatly from this, especially in taking exercise. This patient also felt the want of the pessary when it was removed, but only for a short time. She was examined seven months after the removal of the instrument and was found to be perfectly well.

Injury of the Posterior Vaginal Wall by the use of Pessaries in Cases of Incurable Retroversion.—This case illustrates a class which, though not large, deserves notice. In retroversion with fixation of the uterus, either from a congenital state or because of adhesions or shortening of the post-uterine ligaments, there is sometimes a slight mobility of the uterus which admits of its being partly restored. This leads the practitioner to hope that, by the use of the pessary, the displacement can be corrected. The result is that the posterior portion of the pessary makes too great pressure upon the vaginal wall and produces inflammation and abrasion. This usually causes a free vaginal discharge and pain enough to make the patient seek relief before much permanent injury is done. In all such cases pessaries should not be used at all, but if one is employed in the hope of doing good, it should be abandoned as soon as it causes any irritation.

In these incurable cases, a slight relief may sometimes be given by using a Peaslee's ring, or a Smith's pessary very little if at all curved posteriorly. Either of these instruments will hold the uterus a trifle higher in the pelvis, and this will, in some cases, give a sense of support and relief to the patient.

Overdistention and Atrophy of the Anterior Vaginal Wall from the use of Anteversion Pessaries.—This condition is rarely seen except among the patients of those who look upon anteversion as a morbid state of importance whenever it occurs.

In order to raise the body of the uterus up when it is anteverted, it is necessary to elevate the anterior vaginal wall far beyond its normal position. In order to do this, the instrument must make well-marked pressure upon the parts, and, if this is continued, the muscular wall becomes atrophied and overdistended, and this can be carried on to a very great degree, the whole length of the vaginal wall becoming double that which it originally was.

When the pessary is removed in such a condition, there is at once observed a well-defined and large prolapsus of the vaginal wall, and if the instrument is left out, cystocele will soon follow. This is the rule, but the final results depend to some extent upon the length of time that the pessary has been worn.

The stretching of the vaginal walls caused by pessaries can be overcome by removing the instrument, and prescribing rest and astringent injections. But if the overdistention has been kept up long enough to cause atrophy of the muscular tissue, the injury is permanent and can be very little improved by treatment.

There is also danger to the bladder and urethra from the anteversion pessary. The following case will show how this comes about:

Frequent Urination associated with Slight Anteversion of the Bladder.—The lady was about thirty, and had a child seven years old. She gradually developed a pelvic tenesmus and some irritability of the bladder. She consulted her physician, who diagnosticated anteversion of the uterus, and stated that the disturbed function of the bladder was due to the malposition of the uterus. Thomas's anteversion pessary was introduced by the physician in charge; this gave the patient a sense of support which was agreeable, but more disturbance of the bladder was caused. The physician urged the patient to wear the pessary, telling her that she would get used to it, and the unfavorable effects would pass off; but this proved not to be the fact. The patient then came under my care, having worn the pessary for two weeks; I at once removed it, with the result of giving some relief, but there was still more impatience of the bladder than before the instrument was used at all. The true state of affairs proved to be that the patient had a slight catarrh at the neck of the bladder, not due to the malposition of the uterus at all, and the pessary only increased the original affection.

In proof of this, the symptoms all disappeared when the disease of the bladder was removed, and without changing the position of the uterus in the least.

Cup Pessary with an Extra-Vaginal Support, causing Vulvitis and Ulceration of the Vagina.—All the pessaries having a stem attached to a band around the body have given trouble when worn for any length of time. The evil caused by the one used in this case, is typical of most of them.

The patient lived in the country, and, while suffering from pelvic tenesmus, called in a physician who adjusted a Babcock's uterine supporter for "falling of the womb." She was directed to remove it at night and introduce it in the morning. For a short time she felt some relief, but soon began to suffer from a profuse vaginal discharge and great tenderness about the vulva. The suffering increased until she was unable to walk, and the introduction of the supporter gave great pain.

When I examined her I found the relations of the uterus and supporter as represented in Fig. 171. The uterus was retroverted and the cup and stem were situated in front of the cervix and held the anterior vaginal wall high above its normal position. There was some ulceration of the vaginal wall and general vaginitis and vulvitis.

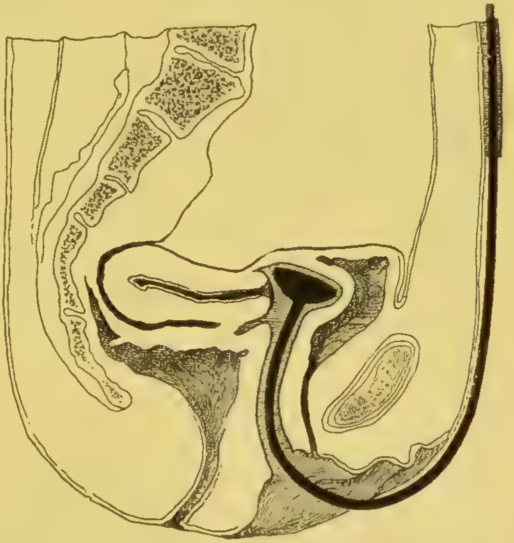


FIG. 171.—Displacement caused by a badly adjusted pessary.

The apparatus was removed, vaginal injections of borax and water employed, and in a short time the inflammation was relieved. The uterus was then restored to its normal position, and retained there with a pessary such as I use in such cases, and she did very well. But for several months there was a tendency to prolapsus of the anterior vaginal wall, owing to the overstretching of it by her former supporter.

The Upper Rim of a Cup Pessary partially imbedded in the Vagina, around the Cervix Uteri.—This patient had a prolapsus uteri, and the physician who had her in care used a cup and stem of soft rubber; the cup was quite a large one and its edges were rather sharp. I think it was called the Barrington supporter. She was much relieved by this instrument, being able to do her duty as a laundress, but she began to have a vaginal discharge and occasional bleeding, with pain and tenderness. I saw her with the doctor and found a ring of raw tissue in the vagina, around the cervix uteri, corresponding to the size and shape of the cup.

The uterus was large, measuring nearly five inches. Evidently the pressure upon the instrument was more than the tissues of the vagina could stand. The patient rested for a time and used vaginal injections; the parts healed promptly, but the scar tissue remained tender, and gave way under the pressure of the instrument, whenever she wore it for any length of time.

I think that this patient could have been cured by rest in the recumbent position until the enlargement of the uterus and relaxation of the vagina had been overcome, and then the pelvic floor restored. But she could not give the time to this, being poor, and obliged to work to live. She was directed to wear a perineal pad fastened to a waist-belt, and she got along fairly well in that way.

A Pessary imbedded in the Posterior Vaginal Wall.—In the current literature there have been many extraordinary cases recorded of pessaries having passed through the vaginal walls into the rectum and bladder. Some of these cases have been very remarkable, and have been recorded as matters of curiosity. Little has been said about the causes of such accidents or how to manage them.

The following case illustrates the most common forms of this accident: The patient was a widow who had borne several children, and had been well until the menopause, when she became insane. At the outset of her mental derangement, her physician suspected that she had some uterine disease, and, on investigating the case, found the uterus larger than it ought to be and retroverted. He restored the organ to its normal position and introduced a pessary which held it there; the instrument was well adapted and answered the purpose well. After this his attention was wholly directed to her mental condition, and she recovered her mind in about one year. The pessary was forgotten by her physician, who introduced it while she was in the asylum. When she came home, or soon after, she began to have a discharge from the vagina and occasional bleeding. I then was called to examine her, and found all that portion of the pessary which rested behind the cervix uteri, imbedded in the vaginal wall. The tissues to the extent of nearly a quarter of an inch had united in front of the pessary bar.

Traction was made upon the pessary until the tissues inclosing it were made tense, and they were then divided down to the instrument; there was much bleeding, but the parts healed well, leaving a large scar in the posterior vaginal wall.

This case is one the like of which is not infrequently seen; they differ from most of those already mentioned, in the important fact that they occur in cases in which the instrument is well adjusted and answers its purpose for a time, causing no trouble until the vagina begins to contract during the final involution at the menopause.

The vagina contracts so much that the pessary, which, at the time of its introduction was small enough and had plenty of room, becomes altogether too large and must imbed itself in the vaginal walls. I have seen a sufficient number of these cases to satisfy myself that they occur in the practice of the most competent gynecologists, sometimes, perhaps, from neglect in giving specific directions to the patient to report from time to time, so that the behavior of the pessary may be watched, but more often from the fact that the patient having been relieved of all her symptoms, either forgets the pessary, or else feels secure and safe, so long as there is no suffering which she can not, in her own opinion, attribute to the menopause, the time when there is the greatest danger of the accident in question.

Pessary entirely imbedded in the Vaginal Walls, except about three quarters of an inch.—This patient came to me when she was forty-six years old; she was still menstruating, but irregularly, and on one or more occasions had menorrhagia. She was suffering from a prolapsus of the uterus which caused her much trouble when she was on her feet. I restored the uterus, and used an instrument to keep it in place. This gave her relief at once, and she was able to take up her duties as in times past. She came to see me several times and I made some applications to the uterus which caused a slight endometritis. I directed her to continue her visits from time to time, in order that I might see how the pessary was acting; this she did not do, for feeling perfectly well, she concluded that there was no need of further treatment, and she acted accordingly. Ten years passed, and though she began to have a purulent discharge and occasional bleeding from the vagina, still she neglected herself. After a time she called a physician, who made a superficial examination, and told her that he suspected that she might have cancer; he advised her to place herself again under my care; this she did, and I found the vagina almost completely closed. On the right side anteriorly, I found a small portion of the pessary exposed, but the rest was imbedded in the vaginal walls and covered over by considerable tissue.

The granular and highly-vascular character of the tissues suggested that the doctor's suspicion of cancer might be correct. The pessary could be felt through the wall of the rectum which appeared to be quite thin at that point.

Passing a sound into the bladder, a part of the pessary appeared to be encroaching upon it. With difficulty the finger could be passed between the free portion of the pessary and the vaginal wall until it reached the cervix uteri, which was normal. The pessary had to be removed, yet the task appeared to be a difficult one. There was so much hæmorrhage caused by the examination that I dared not divide the tissues which enclosed the pessary, neither did I feel that I could with safety rapidly and forcibly tear the instrument out of its place, fearing that I might do damage to the rectum and bladder. I finally adopted the following method with success: Using a Sims's speculum, I seized the part that was exposed in the anterior part of the vagina with a very strong forceps, and with a small finger-saw cut out the section within reach. I then laid hold of an end and by traction caused the pessary to revolve until another portion came into the place of the one removed; this was sawed off, and piece after piece was taken out in this way until the whole was removed.

The sinus was washed out for the purpose of cleaning it and stopping hæmorrhage, but there was so much bleeding that I had to use a tampon to control it.

The patient did quite well, and beyond a marked thickening of the vaginal walls, has now no trace of the injury.

Since my experience with this case, I have seen quite a number of cases of imbedded pessaries, and have removed them in the way described. Two cases I have in mind now in which the pessaries were imbedded in the posterior vaginal wall, which were treated by sawing out the anterior half or third of the pessary, and then by turning the remaining portions around they were removed without breaking down or dividing the tissues surrounding it.

CHAPTER XX.

HYPERTROPHY OF THE CERVIX UTERI.

This is a peculiar and rather rare affection. It differs from the enlargement of the entire uterus, which occurs in pregnancy and in some of the inflammatory affections. The hypertrophy is confined to the vaginal portion of the cervix, and is distinct from the enlargement of the supra-vaginal portion, which occurs in connection with metritis, subinvolution, and pregnancy.

Pathology.—The only change in structure of the cervix is in quantity. The length of the cervix is increased, which is the main point in the pathology. Sometimes it is thickened, but not in proportion to the elongation. It is characterized by great increase in length without increase in the diameter of the cervix, and no changes occur in the composition of the tissues. This is a true hypertrophy, which occurs from causes wholly different from the ordinary conditions which produce hypertrophy. The extent of hypertrophy differs in different cases; this is due, to some extent, to the stage of progress when the first examination is made. In some cases the cervix projects from the vulva one or more inches, while in others the cervix rests just behind the hymen or in the vulva (Fig. 165).

The cervix is generally conical and the os externum is generally small, as it should be in the virgin cervix.

It occurs in the unmarried most frequently, but occasionally in those who are married but sterile.

Symptomatology.—The symptoms are exactly the same as those due to prolapsus. In the first stage there is pelvic tenesmus, and a sense of overdistention of the vagina. The presence of this large cervix causes irritation of the vagina and consequent leucorrhœa. Owing to the great increase in the length of the uterus, it becomes doubled up in the pelvis, and this often affects the menstrual function, giving rise to dysmenorrhœa. In the last stage of the affection, in which the cervix protrudes from the vulva, there is much discomfort; and the feeling of distention causes great irritability of the general nervous system. Excoriations and ulcerations of the mucous membrane are produced.

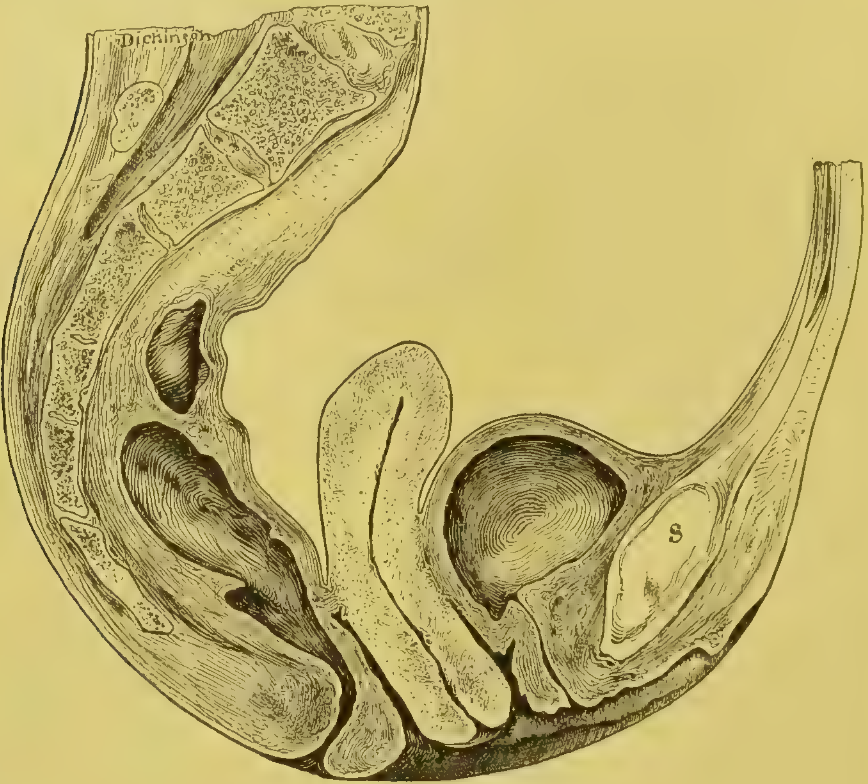


FIG. 172.—Hypertrophy of the cervix. (½.)

Physical Signs.—The bimanual touch reveals the fact that while the fundus uteri is at its normal elevation, the cervix is either down at the vulva or protruding beyond it. At the same time the firmness of the vaginal walls, occupying their normal position, shows the great length of the extra-vaginal part of the cervix. This sign is diagnostic when the cervix is still within the vulva, but when the cervix has escaped through the vulva there is prolapsus of the vagina which obscures the signs to some extent. Emmet claims that elongation from prolapsus of the uterus has been mistaken for hypertrophic elongation. This does not seem possible for one who knows anything about the rudiments of gynecology. By restoring the prolapsed uterus, any little elongation which may have come from stretching will disappear, while no change of position will make any difference of length in hypertrophy. The use of the sound also helps greatly in determining the extent of the hypertrophic elongation.

Causation.—The fact that this affection is limited to the virgin cervix makes it appear as if the hypertrophy might be due to neglected functions, but the fact is that its cause is not known.

Prognosis.—The hypertrophy yields to surgical treatment very promptly. All the cases that I have treated, five altogether, have been completely relieved by amputation of the cervix.

Treatment.—The removal of the superabundant intra-vaginal portion of the cervix by amputation, is the only method of treatment which gives satisfaction.

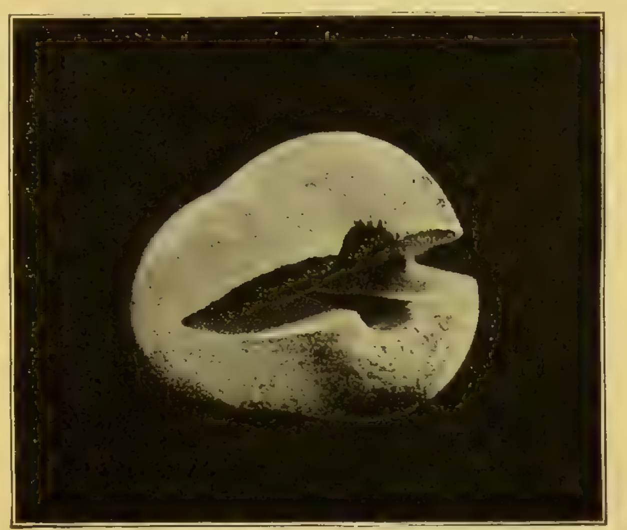


Fig. 173.—The first step; splitting the cervix.

Several methods of operating have been employed, such as the circular method, made with the knife or scissors, the *écraseur*, and the galvano-cautery wire. Originally, in all of these methods the stump was left to heal by granulation. J. Marion Sims greatly improved the operation by covering the stump with mucous membrane. Simon and Marckwald made a double-flap operation, and I have adopted a modification of this method. The details of the operation, as I perform it, are as follows:

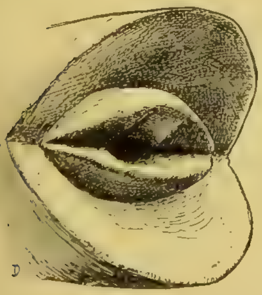


Fig. 174 —The double flaps of the amputation.

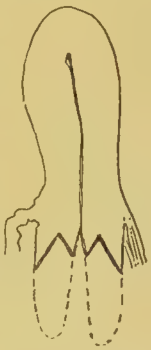


Fig 175.—Diagram of the pieces removed.

A rubber cord is passed around the cervix and drawn tight enough to control the hæmorrhage; the ends of this cord are then seized with a fixation-forceps, which keeps them from slipping, and also holds the cervix in the desired position. The cervix is divided from the canal outward on either side as high up as the amputation is to be made (Fig. 173). The double flaps are then made with the scalpel in such a way that the two short flaps are on the inside (Figs. 174 and 175). The portions removed are wedge-shaped.

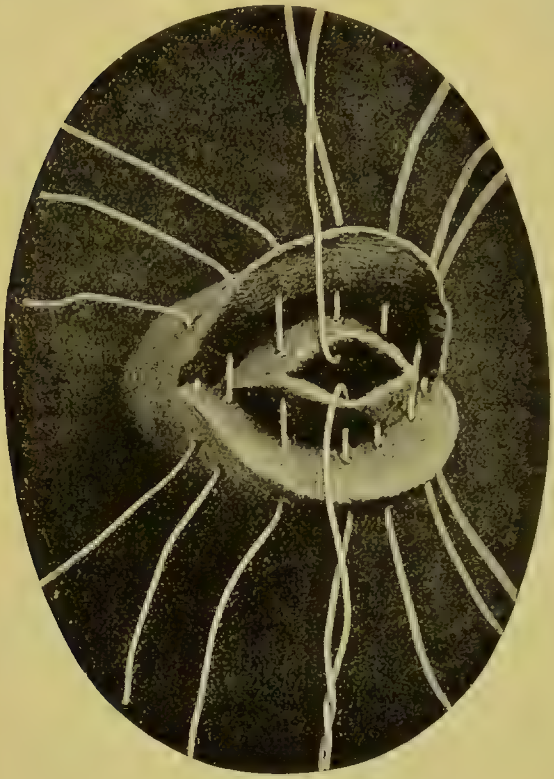


FIG. 176.—The sutures in place.

Two middle sutures are then introduced from the cervical mucous membrane, or short flaps, to the outer mucous membrane, and the lateral sutures are used in the same way as in restoring a bilateral laceration. Fig. 176 shows the sutures as introduced, and Fig. 177 shows them when tied.

Before tying the sutures the rubber cord should be loosened, and if there are any vessels that bleed freely they should be controlled. Slight oozing is controlled completely by tying the sutures.

There are two things which have been brought out by experience, and these should be kept in mind. The first is, that the cervix after amputation retracts or shrinks, so that it should not be amputated too high up, but left a quarter or three eighths of an inch longer than it should apparently be. It will be found short enough two or three months after the operation. The next point is, that the middle and outer layers retract after the operation far more than the mucous membrane of the cervix; especially is this the case when there is a cervical endometritis present. In several of my cases I found, several months after the operation, that the mucous membrane protruded from the os externum, and had to be clipped

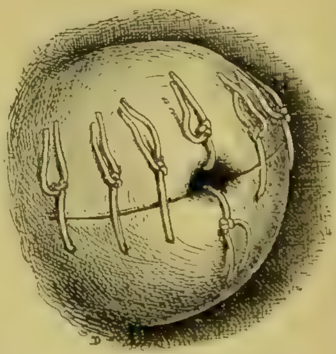


FIG. 177.—The sutures tied.

off. This is a simple thing to do, but by observing the directions this item of after-treatment will not be required.

The after-treatment is the same as that employed in the operation for restoring a lacerated cervix uteri, and need not be described here.

In a certain number of cases I have noticed that the outer walls of the cervix retract more than the mucous membrane after this operation. Immediately after the parts have healed, the cervix is quite perfect, but in a few months the mucous membrane protrudes beyond the muscular wall. This is more likely to occur, I think, in case there is a cervical endometritis accompanying the hypertrophic elongation. When this condition of protrusion or prolapsus of the cervical mucous membrane is found subsequent to amputation, the easiest and quickest way is to draw the superabundant tissue and clip it off.

Just here I may mention that hypertrophic elongation of the anterior half of the cervix occasionally occurs in bilateral laceration. When this elongation is very great, I have found it best to amputate the redundant part as a preliminary to the operation for the laceration. This is done in the same way as taking off a finger by the flap operation.

CHAPTER XXI.

FIBROMA OF THE UTERUS.

This form of neoplasm, which frequently appears in the wall of the uterus, differs materially from growths generally. In many respects it is unlike any other neoplasm in genesis, pathology, and natural history.

Observations made in recent years have led me to reject the hitherto accepted opinion that fibroma of the uterus is developed during middle life.

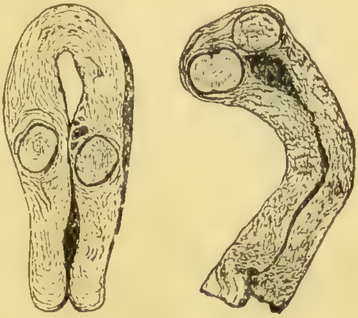
I am now convinced that it is congenital, and has its genesis in lesions of arrangement of the tissue elements of the middle layer of the uterine wall. The only essential difference in the histological composition of the middle layer of the wall of the uterus and fibroma is in the arrangement of the tissues. The muscular coat of the uterine wall is arranged in three layers, longitudinal, circular, and oblique; but these are all interlaced, so that they form one structure or continuous muscle.

In the fibroid neoplasm the fibers are arranged in circular form around a given center, and are cut off or separated from the wall of the uterus by a thin layer of areolar tissue, and do not form part of the uterine wall. It may be said that this tumor is in, but not a part of, the wall of the uterus.

Another difference between the structure of the uterus and fibroma is, that in the developmental changes that take place in the uterus during gestation the rudimentary muscular cells are formed into muscular filaments, while the tissue elements of fibroma increase in quantity but do not change in form or character. It is more of the nature of hyperplasia than degeneration.

The evidence that uterine fibromata have their origin in derangement of embryonic evolution consists in their having been found, in a rudimentary state, in the infantile uterus and in young subjects, and before their presence had been announced by any signs or symptoms. They are also found occasionally with other congenital lesions of development, such as anteflexion of the uterus.

Furthermore, if they originate in a lesion of arrangement of tissue elements (and this, I believe, is a fact), this must of necessity take place during embryonic life. One can understand how transformation of cell elements and the development of new tissue can take place in the formation of tumors; but lesions of arrangement of musculo-fibrous tissue, such as occur in the formation of uterine fibromata, is possible only during development in the embryo.


FIGS. 178, 179.—Interstitial fibromata (Winckel).

Fibroid, fibrous myoma, fibromyoma, and hysteroma are the names that have been used to designate this variety of tumor. I prefer the term fibroma, believing that it is as comprehensive and indicative of the character of this neoplasm as any. Fibromata grow usually in the body and fundus of the uterus, but in rare cases they have been found in the cervix. All of these growths originate in the middle coat of the wall of the uterus, but the direction they take while growing varies in different cases, and this has led to a very clear and useful classification of fibromata. When the tumor remains imbedded in the middle coat of the wall of the uterus it is called interstitial (Figs. 178 and 179); when it grows toward the outside, subperitoneal; and when it grows toward the cavity of the uterus, submucous. Figs. 178 to 180 will show the three forms classed according to location. The subperitoneal variety might well be divided into two classes, those that are situated outside of the broad ligament and those that are within its folds.

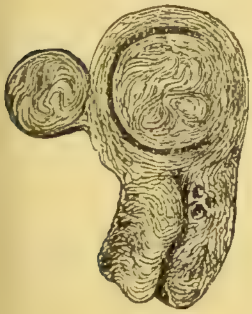


FIG. 180.—Subperitoneal and submucous fibromata (Winckel).

Though very little has been said in books about the fibromata which grow within the folds of the broad ligament, the history of such differs so much from the ordinary subperitoneal variety that a special notice is quite necessary. Fibromata situated in this position, instead of becoming pedunculated, extend outward between the folds of the broad ligament and drop down deep into the pelvis. It is not until they become quite large that they extend up out of the pelvis. Being surrounded by the folds of the broad ligament they are more firmly fixed in the pelvis than other subperitoneal tumors, and consequently cause more displacement of the pelvic organs. The uterus and the bladder are usually pushed far over to the opposite side of the pelvis, and the pressure upon the ovaries and pelvic nerves causes the most pain and suffering of all of this class of tumors. They are more likely to cause cellulitis than when located elsewhere. In some cases the tumor drops down very low in the pelvis behind all the pelvic organs. In one case, unusually large, which came under my care, there was a considerable mass behind the rectum which extended down to the perinæum. It appeared to be a part of the tumor, but I presumed that it must be something else. Dr. Thomas Keith saw the case, and pointed out that the tumor had split up the broad ligament in its growth, and, extending downward beneath the peritonæum, necessarily got behind the rectum.

The location of fibromata has a marked influence upon the history and treatment; the classification should be clearly understood and kept in mind on this account. Those that grow toward the inside of the uterus may remain broadly attached to the uterine wall, or they may become pedunculated.

They may be single, conglomerate, or multiple. The single tumor consists of one mass, the multiple of several masses situated apart and at different places in the uterus, and the conglomerate consists of a number of masses growing close together and surrounded by one capsule.

Fibromata vary greatly in shape. When very small they are usually round, but as they grow they sometimes become irregular; especially is this true of the conglomerate variety.

In all cases the tumor is in a sense distinct from the wall of the uterus. The tumor is in the uterine wall, but not a part of it. There is in almost all cases a clear line of demarcation between the tumor and the tissues of the wall of the uterus. The tissues which surround the tumor and separate it from the neighboring tissues are chiefly cellular, and form what is called the capsule. This, after all, is only a separation in the arrangement of the tissues of the uterine wall and tumor which shows the difference between the two. Were it not for this the morbid growth would be very much like a circumscribed hypertrophy of the uterus. As it is, the development, growth, and decay of fibroids are influenced by the uterus, from which they take their origin and nutrition, and are governed by the same laws.

They increase in size during pregnancy, and generally diminish after confinement, and after the menopause they disappear with the final atrophy of the uterus. Even in the absence of pregnancy the growth of a fibroma resembles the normal growth of a pregnant uterus, in the respect that there is simply an increase of tissue without change of structure. The rule is that fibroids do not increase by growth before puberty, and they usually disappear after the menopause, but not immediately after the cessation of the menstrual function. Usually the menopause is postponed in cases of fibroma, the patient continuing to menstruate until fifty years and over. Neither does the decrease in the tumor begin as soon as the menses stop in all cases. On the contrary, the organic forces which maintained the menstrual function being no longer called for are devoted to the growth of the fibroma, and this growth may go on for some time after the menopause, but the rule is that in time the process of atrophy begins, and the tumor diminishes and finally disappears altogether, or returns to its primitive size.

During the growth of these tumors they frequently change their position and relations to the uterus. The submucous tumor extends more and more into the cavity of the uterus. This change in position diminishes the area of connection between the tumor and uterus. It becomes pedunculated, and in this condition is sometimes described as a fibrous polypus of the uterus. This process of expulsion of the tumor from the uterus may go on until separation is complete, the tumor being expelled as is an ovum in miscarriage. The same changes occur in the reverse direction in subperitoneal fibromata. They frequently become pedunculated, and it has happened that they have become detached from the uterus altogether. When this has occurred (which has not been often) there are usually found adhesions of the tumor to the abdominal viscera, and a vascular communication between the tumor and the parts to which it has become attached has been established. Sometimes such adhesions occur in tumors which are not pedunculated, though it is a notable fact that fibromata are the least liable to form adhesions of all the neoplasms.

These changes of fibromata in relation to the uterus are aided, perhaps effected wholly, by muscular contraction of the uterus. The process is in the nature of an expulsion, and is the natural way by which the uterus endeavors to free itself from such morbid growths.

The density of fibromata differs in different cases, and occasionally changes in the same case. They sometimes, especially if large, become soft and œdematous. Sometimes collections of serum, blood, or pus are found in the tumor. These give a feeling of softness and ill-defined fluctuation. When this condition is found the tumor is usually called a fibro-cyst, but there is a difference in pathology between a fibro-cyst and a fibroma with cyst-like cavities containing blood, pus, or serum.

I have seen two cases of fibroma which gave the physical signs of fibro-cysts. They were both large submucous fibroids, and situated in the body of the uterus, leaving the fundus free. The tumor closed the lower part of the cervix uteri, and the menstrual fluid and secretions of the mucous membrane accumulated in the fundus and upper part of the cavity of the body, and formed what appeared to be a fibro-cyst.

After the menopause these fibromata usually diminish or remain stationary, and give no trouble except by mechanical action upon neighboring organs. The rule is that they either disappear or at least give no further trouble. At one time it was believed that fibromata were capable of being converted into cancer. That is a mistake, I believe. Malignant disease may appear in connection with fibromata, but I have not yet found any reliable evidence that the one is converted into the other.

Perhaps fatty transformation is the usual change which takes place; occasionally calcareous or osseous degeneration occurs. Tumors which have undergone calcareous degeneration I have seen several times, but I have not seen anything like true osseous formations. Perhaps it would express the facts better in most cases to call this material bone-like rather than to convey the idea that it is true bone. These changes or degenerations in fibromata usually are conservative. First the tumor stops growing, and then undergoes atrophy, or is transformed into osseous-like or calcareous material, but in either case the rule is that the patient is relieved. In some rare cases the tissues soften and suppurate, and septicæmia is produced. One such case occurred in my practice and proved fatal.

CHANGES IN THE UTERUS FROM THE EFFECTS OF FIBROMATA.

The pathological changes which take place in the uterus during the presence of a fibroma are of much interest. It becomes enlarged in all cases, but most of all in the submucous and interstitial varieties, less so in the subperitoneal, and least in the pedunculated subperitoneal. Certain changes in the mucous membrane of the uterus usually occur. There are, in many cases, polypoid growths developed, and endometritis is almost always present.

In regard to the changes in the mucous membrane which occur in connection with fibroma, Dr. Wyder, of Berlin, makes the following statement:

"Fibromyomas are said to be likely to give rise to malignant diseases of the mucous membrane. Martin has formerly maintained that these conditions furnish an indication for total extirpation. The writer, having examined a number of cases, does not share this view.

"With subperitoneal myomas the mucous membrane was found much thickened ; the most important alteration was a very perfect glandular endometritis. In one case adenomatous polypi were present ; in another, on one side glandular, on the opposite side interstitial, endometritis.

"For interstitial myomas three groups must be formed :

"1. Where the tumors are separated from the uterine cavity by a wall one half to one centimetre thick.

"2. Where the tumor is beneath the mucous membrane but does not project.

"3. Where the tumor projects largely into the uterine cavity.

"Of seven cases in the first group, in one no alterations were found ; in two, glandular endometritis (mucosa four to ten millimetres thick) ; in three, interstitial endometritis. In most cases the vessels were very numerous and their walls very thick.

"In the second group, the deeper layers of the mucous membrane were completely transformed into connective-tissue trabeculæ ; at the surface was a greatly dilated capillary network with thick-walled vessels.

"In the third group, interstitial endometritis was found.

"The thicker the wall separating the tumor from the uterine cavity the more is the glandular structure developed (glandular endometritis) ; the closer the tumor approaches the mucous membrane the more pronounced becomes the connective-tissue character of the proliferation in the mucosa (interstitial endometritis). We then find the mucosa on one side atrophied into connective tissue, and on the other in a state of glandular proliferation. As regards the source of the hæmorrhages, it should be remarked that no vascular changes are to be expected in subperitoneal tumors. It was found that where glandular endometritis was alone present no hæmorrhages had gone before. In the case of interstitial tumors associated with glandular endometritis exclusively there was likewise no preceding hæmorrhage. It was present only with interstitial endometritis. Therefore hæmorrhage will not take place where the interglandular tissue is quite intact ; but it will occur where both structures proliferate equally (endometritis fungosa), or where one or the other form develops predominantly, or where glandular endometritis exists on one side and interstitial endometritis on the other. Compression of the numerous vessels causes venous congestion; hæmorrhage will set in, especially when glands and tissue have proliferated equally. The glands exert no influence on the under surface; their character is usually benign. The border line between mucosa and muscle is intact. Endometritis glandularis is of a benign nature."

These pathological changes in the mucous membrane and the increase in its extent by the great enlargement of the uterus cause a marked increase in the vascularity. To this state is due the menorrhagia and hæmorrhage which are so generally present in cases of fibromata. Deformity of the uterus is produced in many cases, but in some even large tumors the uterus presents the form present in pregnancy. It is simply enlarged but not changed in form. There is often displacement of the uterus, especially in the interstitial and subperitoneal varieties. The tumor either drags the uterus toward the side upon which it is located, if it is small, or pushes the uterus in the other direction, if the growth is large.

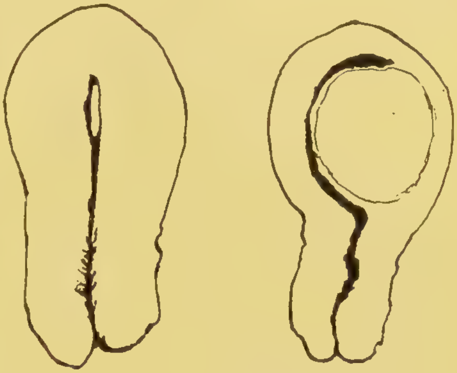
The cervix uteri may be disturbed in many ways. It is sometimes greatly elongated and far out of its normal position. Many times it is spread out on the tumor so that it appears to be a part of it. The canal of the cervix is often tortuous and its caliber lessened. Pressure of the uterus upon surrounding organs may cause derangement of function. These effects depend upon the size and location of the tumor, with reference to the degree of the derangement. When the tumor is still small enough to remain in the pelvic cavity and make pressure to a limited extent only, the symptoms produced resemble those caused by uterine displacements and small ovarian cysts. The rectum may be pressed upon and its function perverted. The bladder may suffer from pressure which may prevent it from distending, or it may be rendered irritable and tender. In some cases the pressure may become so great that the function of the bladder and rectum may suffer, and even the ureters themselves may be affected in the same way. I have seen several cases—three in all, I think—where the ureters were obstructed from the pressure of fibromata, and the kidneys were affected in consequence. The pressure may become so great that the function of the rectum or bladder becomes arrested, and inflammation of the cellular tissue or peritonæum may occur and prove fatal. I have repeatedly seen slight attacks of pelvic inflammation caused by pressure of fibromata; one case proved fatal from pelvic inflammation and rectal obstruction. I saw the patient first when she began to have inflammation, and I found the tumor impacted in the pelvis and it could not be dislodged by any means. The inflammation progressed, and the obstruction of the rectum became complete by the addition to the tumor of the products of the inflammation. In most cases the tumor can be raised up out of the pelvis when it becomes large enough to give much trouble. The pressure may be upon the pelvic nerves so as to cause very great pain. When fibromata escape from the pelvic to the abdominal cavity they do not cause so much trouble unless they become very large. They may cause peritonitis and intestinal obstruction, but that is rare. They were formerly supposed to cause ascites, because fluid in the peritoneal cavity was found in a certain proportion of cases. Keith believes that this fluid is a transudation from the tumor rather than from the peritonæum, as in ordinary ascites. The quantity of the fluid is seldom sufficient to cause much distress.

Symptomatology.—The symptoms of uterine fibromata are naturally of three kinds: First, those manifested by the general system, which are also called constitutional or remote; second, those which originate in the uterus itself; and, third, those that are produced by the pressure of the tumor upon neighboring organs. The severity of the remote symptoms depends upon the size and location of the tumor. There are a great many patients who do not suffer in general health from fibromata of the uterus until the growth has advanced to a considerable size. Sooner or later, according to the extent of disturbance which the growth causes, the general health becomes impaired. The patient becomes anæmic and is generally debilitated, because of either the loss of blood or deranged nutrition, or both. These symptoms are not by any means diagnostic, but may come from a variety of affections. In the most marked cases, when the patient is extremely anæmic, the skin becomes slightly bronzed, and gives to the patient the appearance of having malignant disease. The symptoms which are manifested by the uterus are pain and hæmorrhage. The pain is not always pronounced, in some cases it is not at all persistent. It is irregular, spasmodic in character, and is most marked when the tumor is submucous, and least so in the interstitial variety. The hæmorrhage is the most prominent symptom of all. It usually comes on periodically, and is therefore in some cases a menorrhagia. Menstruation is too free, and lasts too long and recurs too often. Bleeding may come at any time, there being no regularity whatever in some cases. This symptom is so constantly present, that Dr. J. Mathews Duncan called fibroma the bleeding disease of the uterus.

This name is well deserved, for certainly no other affection gives rise to so much hæmorrhage of the uterus as does this. The size of the tumor does not influence the severity of the bleeding. In some small tumors the bleeding is greater than in others of monstrous size. It is the location of the tumor and the complications, such as endometritis in various forms, which determine the hæmorrhagic symptoms. It is greatest in the submucous, less in the interstitial, and least in the subperitoneal, as a general rule. The submucous pedunculated variety is the most liable of all to cause bleeding. A very small tumor of this kind may cause the most persistent and exhausting hæmorrhage. The symptoms produced by the pressure of the tumor upon neighboring organs are generally most marked when the tumor occupies the pelvic cavity; then the pressure upon the bladder and rectum causes irritation and functional obstruction of these organs, and less or more pelvic tenesmus of a general character. The effect upon the bladder is to render urination very frequent and sometimes difficult or impossible. I have seen three cases in which there was retention of urine. The tumor was pear-shaped in all of them, and large enough to extend above the brim of the pelvis. The urethra and bladder were carried upward, so that the urethra was caught between the tumor and the pubic bones and compressed. Urination in these cases was for a time difficult, and then retention came. All voluntary efforts to evacuate the bladder only made matters worse, by forcing the tumor downward and wedging it into the superior strait. Relief was given first by the catheter, and then by pushing the tumor upward, the patient being placed in a knee-chest position. Pressure upon the pelvic nerves and ovaries often causes much pain. Pain in the back and limbs, which is often present, no doubt comes from the same cause.

Pressure upon the ureters may cause obstruction and hydronephrosis, and all the unfortunate results to the kidney which must follow. In such cases there is at first pain in the region of the ureters, and subsequently the symptoms of renal disease appear. Fibromata large enough to occupy the cavity of the abdomen give very little trouble, as a rule. Very large tumors interfere with free respiration, and the action of the stomach and bowels to some extent. The ascites which sometimes accompanies fibromata of the uterus was supposed to be due to irritation of the peritonæum. It is more likely that it is a transudation from the tumor itself, as already stated. This is suggested by the fact that hydro-peritonæum is usually found in connection with œdematous tumors.

Physical Signs.—The positive signs of fibroma are the increase in size, change in form and consistence of the uterus, and the displacement or distortion of the canal, as related to the body of the uterus. The touch discovers the fact that the uterus is enlarged, apparently, and by the bimanual touch it usually can be proved to be really so. The shape of the uterus is changed in nearly all cases. It is irregular in outline, one side being much larger than the other. In the subperitoneal variety this deformity is quite marked. The tumor projects from the surface of the uterus so boldly that it can be instantly detected. In some of the cases of submucous fibroma, and occasionally in the interstitial, the uterus is uniform in shape and appears like a uterus enlarged by gestation; and even when there is some irregularity of form it is not unlike that which is often found in pregnancy, but the uterus is very hard in the one case, while in the other it is very soft. The hard character of the tumor and uterus is a very reliable sign of fibroma. In all conditions which cause enlargement, the uterus is softened except in fibroma and in very rare cases of cancer. Whenever the uterus is enlarged and indurated, fibroma may be strongly suspected.


FIGS. 181 and 182.—Enlargement due to subinvolution compared with that from growth of a fibroma (after Winckel).

Deflection of the canal of the uterus from the center is a very important sign of fibroma. The relations of the canal of the uterus to the axis of the pelvis, as shown by the sound, are changed in all forms of displacement, but the canal is still in the center of the uterus. In fibroma the canal is excentric and very often tortuous. The use of the sound, by which this displacement of the uterine canal can be detected, gives this most valuable evidence of the existence of a fibroma. Figs. 181 and 182 will show this point very plainly. The one shows a uterus large, owing to subinvolution, the other about the same size from enlargement due to a fibroid.

In not a few cases the canal is so deflected, displaced, or compressed, that the sound can not be passed. A flexible bougie may be used under these circumstances, and although it will not positively show the position of the canal, it gives valuable indications of it. When the sound can not be used at all, this valuable sign is not obtainable, but the fact that the canal in a large uterus will not admit the sound is evidence of fibroma. There is no other condition of enlargement of the uterus in which the sound can not be passed, as a rule.

Small fibromata, which occupy the pelvic cavity, present some physical signs which resemble displacements of the uterus, ovarian tumors, tubal pregnancy, the products of former inflammations and diseases of the Fallopian tubes.

The differentiation between flexions and versions of the uterus and fibromata is based upon the following facts: In flexion and version the uterus is not much enlarged, and, as a rule, can be restored to the proper position when all signs suggestive of fibroma disappear, and then, too, the sound shows that the cavity of the uterus is not displaced nor enlarged. Ovarian tumors are distinguished from fibromata by being less dense and not usually fixed to the uterus; one can be moved without the other. Early pregnancy is usually distinguished from a fibroma by the history and symptoms, but the physical signs differ. The uterus is soft in pregnancy, while it is unduly hard in fibroma. The enlargement and softening extend to the cervix in pregnancy, but not in fibroma. Should a doubt exist, the differential diagnosis can easily be made in a short time by watching the progress of the case. The signs of pregnancy will soon become sufficiently pronounced to settle the question.

The most difficult cases to deal with are those in which pregnancy takes place while there is a fibroma present. I have seen several cases of this kind. Two of these were pregnant when first seen, and in both the diagnosis of fibroma was made and in only one did I suspect pregnancy at my first examination. In the others I was aware of there being a fibroma present, but I did not detect the pregnancy until several months had elapsed.

Fibromata situated within the folds of the broad ligament are not easily distinguished from the products of a pelvic cellulitis, extra-uterine pregnancy, and disease of the Fallopian tubes. The history of the case, taken in connection with the physical signs, will usually suffice to enable one to make the diagnosis.

Large fibromata which occupy the abdominal cavity have to be differentiated from fibro-cysts of the uterus and ovarian tumors. In regard to the distinctive signs by which the diagnosis between ovarian tumors and fibromata is made the reader is referred to the section relating to the diagnosis of ovarian tumors.

The solid hard fibroma is easily distinguished from a fibro-cyst of the uterus by its density, as recognized by the touch, but a soft fibroid may be so elastic as to give the signs of an imperfect fluctuation, and simulate a cyst with a thick wall. In such cases of doubt the chances are in favor of the tumor being a soft fibroma, but if it is very necessary to make a diagnosis it may be done by aspiration. The accumulation of fluid in the upper part of the cavity of the uterus, occurring as a complication of a uterine fibroma, gives the physical signs of a fibro-cyst so perfectly that one must certainly be led to make a false diagnosis. I have seen two such cases; one was a very large intra-uterine fibroma which closed the canal of the uterus below by pressure in the latter stages of its growth. The secretions of the mucous membrane accumulated at the fundus and gave distinct fluctuation. One of the most distinguished gynecologists of this age saw the patient with me, and thought, as I did, that it was a fibro-cyst, but it was not.

The histories of these cases, especially one which is given further on, will show more fully the peculiar character of the pathology and the difficulties of diagnosis.

Causation.—The causation of uterine fibromata remains as obscure as ever. Granting that they are the results of lesion of evolution leaves the question of the derangement of development unsettled. Heredity may probably have something to do with it. A lesion in the arrangement of the fiber of tissue might be transmitted as surely as the distribution of colors. The fact that these neoplasms prevail in certain families and races favors this theory. Certain facts in regard to age, race, and social relations have been ascertained which favor the growth of these neoplasms. The age when fibromata grow is between thirty and thirty-five years. There are many exceptions to this, however, but it is rare to have these growths appear before puberty or after the menopause. It may be more correct to say that they never attain any appreciable size before puberty and rarely after the menopause. In regard to race, the negro is more liable to fibromata than the white, although no good reason has been discovered why this is the case. The influence of the social relations is stated by Thomas Addis Emmet as follows:

"The development of these growths is retarded by child-bearing, and even by marriage, for the sterile woman is less liable than the old maid, but in turn she is more so than the woman who has borne children." These facts are deductions from large tabulated observations of cases by Dr. Emmet. He also gives his views regarding the social state as related to the causation of these neoplasms in the following words:

"Between the ages of thirty and forty years the unmarried woman is fully twice as subject to fibrous tumors as the sterile or the fruitful. I have already referred to this subject, when treating of the causes of disease, and pointed out that this is one of the tributes which an unmarried woman pays for her celibacy. It seems as if it were the purpose of Nature that the uterus should undergo the changes dependent upon pregnancy and lactation about once in three years throughout the child-bearing period, and that if the uterus is not physiologically occupied in child-bearing there is greater liability to the development of fibrous tumors as the woman advances in life. This will also be the case with the married woman who has taken means to prevent conception, as well as with her who has been sterile from some cause beyond her control, but to a less degree in the latter case. I think I have had occasion to note that the sterile woman who has earnestly wished for children does not have her liability to fibrous tumor increased by the fact of her sterility—an instance, probably, of the remarkable effect of mind upon the body. Finally, the woman who may have been fruitful in early life, but remained sterile long afterward from some accidental cause, may have a tumor developed, but is less liable thereto from having once borne a child."

From my point of view, the statements of Dr. Emmet given above refer to the growths of fibromata, not to their genesis or development.

Prognosis.—Fibromata of the uterus, while the most frequently seen of all the neoplasms of the sexual organs, are the most harmless so far as their tendency to destroy life. They occasion suffering, but rarely prove fatal. Many patients are unable to live on until the menopause, when the tumors disappear altogether, or become reduced during the final involution of the uterus so that they are harmless.

The complications are, first, hæmorrhage, which recurs so often in many cases that it endangers life. Very few patients bleed to death directly, but some become so reduced by the long-continued loss of blood, which impairs nutrition, that death comes as the result of some secondary affection which would not have occurred except for the exhausted state of the patient. Peritonitis and cellulitis are liable to be set up by fibroma, and of the fatal cases peritonitis is a not infrequent cause. Softening of the tumor and decomposition may cause a fatal septicæmia. Blood-poisoning sometimes occurs during the expulsion of intra-uterine fibroma. The tumor, being in part cut off from the circulation, undergoes necrosis before its expulsion is completed, and causes septicæmia, and death takes place when relief and recovery appear to be within the immediate reach of the sufferer. Pressure upon the pelvic organs may cause death by arresting the functions of these organs. This is most likely to take place when the tumor grows in the broad ligament and is therefore fixed in the pelvis. I have also seen death occur from pressure upon the ureters causing obstruction to the flow of urine, renal disease, and finally uræmia. Although there are dangers from all of the complications named above, the number of fatal cases is very small even when left without treatment; and by judicious management a large number can be relieved entirely, or helped sufficiently to be able to pass through life in comparative comfort. Within the past few years such means as ovariotomy, hysterectomy, and electrolysis have been employed in the treatment of uterine fibroma, with results which raise the hope that the great majority of these neoplasms will be controlled, and the death-rate from this cause reduced to a minimum.

Treatment.—The size and location of uterine fibromata, and the conditions and complications produced by them, differ very greatly, and hence the treatment must vary with each case. Uterine fibromata, when discovered in the rudimentary or latent state, are amenable to treatment. A careful study of many cases has convinced me that these tumors are disposed to remain in a latent state until they come under conditions favoring their growth, such as sterility, deranged menstruation, and endometritis. In other words, it is more easy to keep a fibroid from beginning to grow than to arrest its growth after it has begun. It is evident that any derangement of the functions of the uterus favors growth of fibromata. It naturally follows that the relief of any diseases of the uterus which derange or interrupt any of its functions will indirectly control the growth of fibromata. This I have demonstrated many times. I have on record a number of cases of imperfect development with small fibroids of the uterus, manifested by irregular and painful menstruation, that upon being relieved of the malformation and impaired nutrition have suffered nothing from the fibroids. Several patients after being cured have become pregnant, and while the fibromata appeared to increase in three of them during gestation, they reduced in size during post-partum involution of the uterus. In eighteen cases of pregnancy with fibroma of the uterus, seven miscarried and eleven were delivered at full term; two of them were twice delivered safely. The subsequent histories of ten were kept for periods varying from one to four years, and in only one did the fibroma grow to any appreciable extent.

In some of my cases the tumors had attained considerable size before gestation took place, and as they remained stationary, for some time certainly after confinement, it appears that gestation retarded their growth.

The indications for treatment (when fibromata are rudimentary and latent, and also when they are growing but are small) are to remove all malformations, malpositions, and inflammations, or other curable lesions that may be present; in short, to restore the uterus to its normal structure so that it may perform its functions. When this is accomplished the growth of fibromata is prevented in the great majority of cases.

The above may be called the preventive treatment—that is, treatment which prevents growth. When this fails, or in cases having progressed far enough to cause trouble, the treatment required is of an entirely different character.

The ways and means may be said to vary from the simplest medication to the most daring surgery, and each method, if judiciously adapted to the requirements of cases as they come, gives satisfactory results.

Medicinal agents have been employed in great variety, but ergot alone has been found of real value. The action of ergot upon fibromata may accomplish beneficial effects in two ways. By exciting uterine contractions, it may produce expulsion of the tumor if its relations to the uterine wall are such that it can be expelled. On this account ergot does its best work in the submucous variety of uterine fibromata. In the same way the ergot, by causing contraction of the uterine walls, may lessen the area of attachment of a subperitoneal fibroma, and arrest or retard its growth by lessening its blood-supply. This view of the beneficial effects of ergot upon the progress of subperitoneal fibromata is based upon the fact that when such tumors are pedunculated they do not, as a rule, grow so fast as when they are attached to the uterus by a broad base. In this respect the action of ergot is simply to aid in the natural method of disposing of these growths—viz., by expulsion, which in the submucous or intra-uterine variety is often complete, the growth being wholly expelled from the uterus.

Ergot also acts in another way to arrest the growth of such tumors. By keeping the uterus in a condition of permanent contraction, and by contracting the blood-vessels, the size of the tumor is diminished, and atrophy takes place. In order to obtain the good effects of ergot in this way, it must be given in liberal doses, sufficient at least to produce all the contractions of the uterus that the patient can endure the pains of, and it must be continued for a long time. It sometimes happens that the patient can not take ergot for any length of time without having indigestion and loss of appetite; occasionally, also, the uterus fails to contract in response to full doses of this drug. In either case it is useless, and should not be continued.

In some cases the use of ergot, while it does not diminish the size of the tumor nor aid in its expulsion, appears to retard its growth, and it also controls the bleeding, which is a great gain. When the patient can be guarded against the great loss of blood, she may be enabled to live in comparative comfort and usefulness until the menopause.

Electrolysis.—This method takes a high rank among the means of treating fibroma of the uterus. In order to fully comprehend this subject, some knowledge of the elements of electro-physics should be obtained. For this we must refer our readers to the text-books on this subject.

Method of applying Electrolysis in the Treatment of Fibroid Tumors.—The method of using the current which I have adopted is to pass an electrode into the cavity of the uterus, and insulate that portion of the instrument which rests in the vagina. The other electrode—a broad one—is applied over the abdominal surface where the tumor is located. The electrode in the uterus is connected with the negative pole of the battery, and the other with the positive. The current is then gradually turned on, until it is as strong as the patient can tolerate and is continued for eight or ten minutes. This is repeated every third or fourth day. The electrode which is introduced into the uterus is shaped like a uterine sound. The portion of it which occupies the cavity of the uterus is made of platinum. The rest is copper covered with hard rubber, and over this there is a sheath of rubber, which can be moved forward or backward to regulate the length of the portion to be insulated, which varies, according to the depth of the canal of the uterus in different cases.

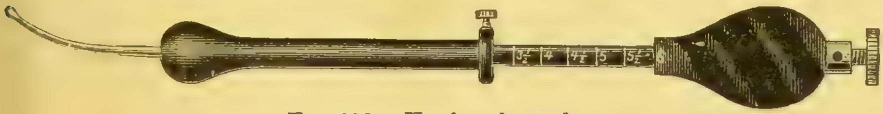


FIG. 183.—Uterine electrode.

Fig. 183 shows this instrument. The electrode which Apostoli uses for the outside of the tumor is composed of sculptors' clay, rolled, cut to a size sufficient to cover the prominent part of the tumor, and about half or three quarters of an inch thick. The clay is covered with some thin fabric, like cheese-cloth, to keep it together. This is applied over the abdomen, and then a broad metallic plate applied over the clay. This answers very well so far as fitting the rounded abdominal surface, and by its own weight it keeps its place and also protects the skin from irritation. It is not very convenient, however. The clay has to be kept wet all the time, in order to be ready for use when needed. It also requires to be made warm in cold weather, and is not very clean to handle. Owing to these inconveniences of the clay, other materials have been used. I employ a sheet of absorbent cotton about half an inch thick when wet, and gently compressed, and over that an electrode made of a number of small metallic plates fastened together with wire. In this way the electrode fits the irregular curves of the abdominal walls. Even this is not exactly what I desire. While it is free from the objections of the clay, it does not adapt itself to the body as well as the clay. This leads me to believe that something more convenient than anything now in use may yet be devised.

This is the method of using electrolysis in the way which appears to me to be most acceptable, but there are modifications as practiced by some which should be noticed.

Some prefer to anæsthetize the patient and use a current stronger than the patient could otherwise bear. This may insure more rapid progress in the treatment, but it is perhaps more dangerous and disagreeable to the patient. I prefer a current which the patient can tolerate, and continue it longer at a time and repeat the treatment oftener.

It not infrequently happens that the cervix uteri is displaced, so that the electrode can not be introduced into the uterine cavity. In such cases a needle-pointed electrode should be thrust into the tumor and the current passed in the usual way. Apostoli speaks of this as making an artificial canal in place of the normal one of the uterus.

In order to maintain this canal made by the first puncture, the current used must be strong enough to destroy the tissues in immediate contact with the instrument. Should the opening close, another puncture can be made at the next treatment.

In cases where there is severe menorrhagia Apostoli recommends the introduction of a positive electrode into the uterus, and the use of a current strong enough to slightly char or dry the mucous membrane, and in that way arrest the bleeding. This is no doubt good practice when the bleeding can not be arrested by other means, such as curetting or the application of astringents.

Menorrhagia, when it is present, can sometimes be helped by treating the endometrium.

The endometritis is often attended with fungous growths which greatly increase the tendency to hæmorrhage. The removal of such fungosities with the curette will often give relief, and the subsequent application of tincture of iodine to the uterine mucous membrane at regular intervals is of service. In order to use the curette and apply the iodine, it is necessary that the cervical canal should be sufficiently large to permit an entrance to the uterine cavity. In some cases the cervical canal is so narrow and the cavity of the uterus so deflected that to reach it is sometimes impossible. In such conditions sufficient drainage after treatment is not obtainable, and hence the very great danger.

When expulsion, with or without the use of ergot, has advanced far enough to pedunculate an intra-uterine tumor and dilate the cervix uteri, the tumor can be separated from the uterine wall by dividing the pedicle. When the dilatation of the cervix is complete, and the tumor is expelled from the uterus and lodged in the vagina (the pedicle still remaining attached to the uterus), the separation and removal of the tumor are quite easy.

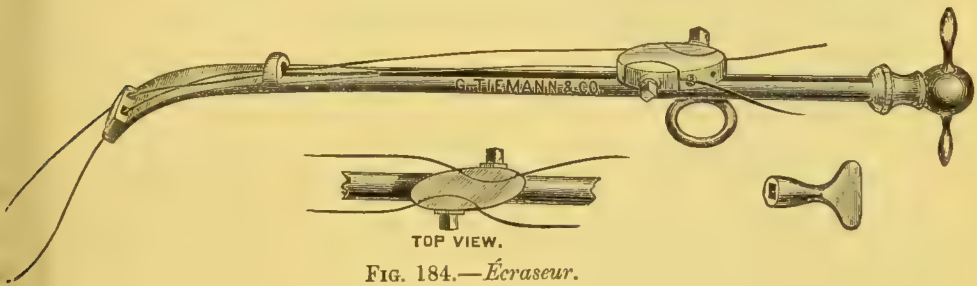


Fig. 184.—*Écraseur.*

There are several methods of dividing the pedicle. I prefer to use the wire *écraseur.* The galvano-cautery *écraseur* has been used, but it is difficult to apply, and it is impossible to avoid burning the uterus and vagina; it has no advantages over the wire or chain.

The *écraseur* which I use is modified to suit the wire. The portion to which the wire is attached is so arranged that each end of the wire is held fast by a pinching screw, so that the loop of wire can be lengthened or shortened in a moment (Fig. 184). I employ the steel wire used for piano or zither strings, the thickness of the wire being adapted to the size of the pedicle. The wire has one very great advantage over the chain in being easily applied. It is elastic, and yet stiff enough to be easily made to slip over the tumor to be snared.

Objections to the wire or chain *écraseur* have been raised. There is danger, it has been claimed, of the uterine wall being drawn into the grasp of the chain and a part of it removed, and an opening made directly into the peritoneal cavity. The fact is, that as the wire is tightened around the pedicle the tissues are forced out of its grasp equally on both sides. There is no drawing of the tissues into the grasp of the wire.

If there is inversion of the uterus at the point of attachment of the pedicle, the wall of the uterus might be included in the *écraseur* wire and removed. This happened once in my own practice, and I believe the same thing has been done by other operators. Fig. 185 shows the condition referred to as it occurred in my own patient.

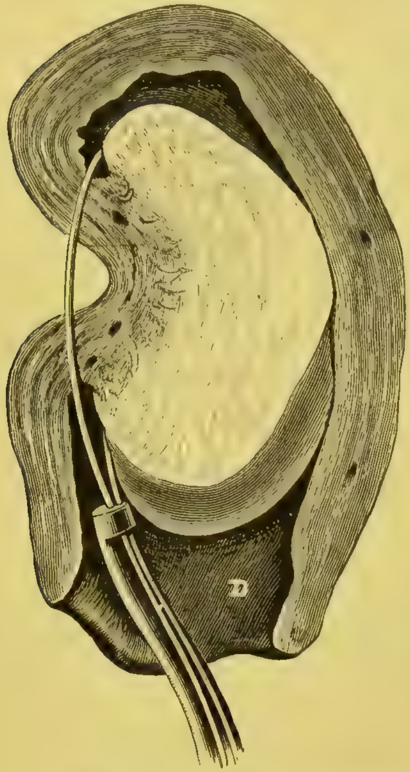


Fig. 185.—Wall of uterus caught in *écraseur*-wire and removed.

The inversion of part of the uterus was not detected before the operation was completed, but an examination of the tumor showed that the inverted portion of the uterine wall was completely removed. No harm came from it. The patient did well, but the greatest anxiety was felt for some time.

Sometimes it happens that the tumor, while it protrudes into the vagina to a slight extent, is grasped by the cervix so firmly that the wire of the *écraseur* can not be applied. The same difficulty has been encountered when the tumor—the size of a fetal head—is lodged in the vagina. Under such circumstances, the tumor should be reduced by rapidly taking sections of it away with a strong scissors, and then the *écraseur* can be used, or if the hæmorrhage is not great the base of the tumor should be enucleated.

Much care and gentle handling of the enucleating instrument should be employed, because the muscular wall of the uterus at the point of attachment of the tumor may be absorbed, and the base of the tumor rest upon the peritonæum. This state of affairs I have found in two cases which I treated by enucleation, the histories of which will be given.

Intra-uterine fibromata have been treated by enucleation before they became pedunculated, and before the cervix was dilated. Dilatation or descision of the cervix was made and the tumor enucleated. When the tumor was high up the capsule was incised, and ergot given to bring the tumor within reach of the operator.

At one time this treatment was quite in vogue in this country. The operation is difficult and dangerous, and the results so unsatisfactory that it was abandoned years ago.

Removal of the ovaries for the relief of small fibromata which cause exhausting hæmorrhage has given satisfactory results. This plan of treatment was suggested by the fact that these neoplasms disappear, as a rule, after the menopause. Reasoning from this, it was presumed that by removing the ovaries, and thereby inducing the cessation of the menstrual function prematurely, the same effect upon the fibromata would be obtained. It was found to be so, and hence in properly selected cases the removal of the ovaries gave excellent results. Since hysterectomy has been perfected the removal of the ovaries for the cure of fibroids has been abandoned by the vast majority of surgeons.

Supra-vaginal Hysterectomy.—The evolution of this operation is most interesting, and were this work in any degree historical a chapter on the subject would be required.

In the beginning, the uterus proper was removed, and the cervix left as a pedicle, which along with the broad ligaments was included in a clamp and left in the lower end of the wound. It was impossible in this way to apply the clamp at the junction of the body and cervix without including a part of the bladder or making extreme traction of the outer portion of the broad ligaments. The stump formed in that way was very large and very unsatisfactory. Keith overcame this difficulty by clamping the broad ligaments and separating them from the uterus, and also dissecting off the bladder in front, when necessary, so that the uterus could be raised up and the clamp applied at the upper portion of the cervix uteri. The broad ligaments, being freed from the fundus uteri, were included in the clamp without traction. Many modifications of this extra-peritoneal method of treating were introduced by Hager, Treub, Martin, and others, but none proved sufficiently satisfactory to stay. Though most excellent results were obtained in this way the convalescence was slow, and Keith and others sought for some way of treating the pedicle by the intra-peritoneal method, the same as in ovariotomy. Schroder, Martin, A. Palmer Dudley, and others, after ligating the broad ligaments, amputated at the junction of the body and the cervix uteri, and sutured the stump and covered it with the peritonæum.

The results were not equal to those obtained by subsequent improvements, such as the method of B. F. Baer. His method of operating is so much in advance of the older ways that I quote his own description of it:

"After the required abdominal incision is made, all existing adhesions of omentum, intestines, etc., are separated in the usual way, and the tumor lifted out of the abdominal cavity. If the incision has been an unusually lengthy one, several sutures are placed at its upper end for the better protection of the intestines. The patient may now be elevated to the Trendelenburg posture, if deemed best, and the parts thoroughly studied, so that a clear idea as to the character and location of the tumor and pedicle may be obtained before the ligation and separation are begun. The first step in the operation is the passing of a single silk suture through the broad ligament near the cervix. This ligature is again made to transfix the broad ligament near its outer edge, to prevent slipping; it is then tied. A stout pedicle forceps is next placed under the Fallopian tube and ovary, and made to grasp the broad ligament for the purpose of preventing reflux from the uterus. The ligament is now severed just below the forceps, the incision being carried close to the tissue of the tumor. If deemed necessary, another ligature is now passed through the broad ligament farther down along the side of the cervix. This ligation and cutting are now repeated on the opposite side. The knife is then run lightly around the tumor an inch or two above the peritoneal reflexion of the bladder in front, probably a little lower behind, and the severed edges of the peritonæum stripped down with the handle of the scalpel for the purpose of making peritoneal flaps. The next step is a most important one: it is the ligation of the uterine arteries. This is done in the broad ligaments, outside of but close to the cervix. Care must be taken to avoid the ureter on the one hand and the cervical tissue on the other. The ligature may either be placed within the folds of the severed ligament, or, which is preferable, made to encircle the double fold of the ligament and artery in one sweep; action here will depend upon the size of the pedicle and the consequent separation of these folds. The constant traction which is made upon the pedicle by the assistant, who is holding the tumor, serves to draw out and elongate the cervix after the peritoneal covering has been incised, and thereby to permit deeper incision into the neck, which is next amputated with the knife by a sort of cupped incision. The stump is now grasped with a small volsella forceps, and further trimmed and reduced, if necessary, so that the entire supra-vaginal portion is removed before it is dropped back into the pelvis. The cervix being now released, it immediately recedes, and is drawn deeply into the pelvis by the retractive and elastic properties of the vagina, where it is buried out of sight by the peritoneal flaps covering it. These flaps have been rendered so taut by the ligatures which have been placed that usually, as the cervix recedes into the pelvis, they close over it like elastic bands. The cervix is now in its natural position, and without a ligature or suture in its tissues. The operation is finished by infolding the edges of the peritoneal flaps, which may be secured by Lembert sutures, if necessary. I have not found this necessary if the ligatures which secured the uterine arteries have also grasped the several folds of the broad ligaments, for this so tightens them that the sides are brought forcibly together when the cervix is drawn under. If any other vessels are found spurting, they are, of course, ligated."

Abdominal Hysterectomy.—The operation which I have adopted is that practiced and described by Prof. Howard A. Kelly, of Baltimore. I quote his description in full:

"The operation consists in the following steps:

"1. Opening the abdomen.

"2. Ligation of the ovarian vessels near the pelvic brim, either on the right or on the left side, clamping them toward the uterus, and cutting between.

"3. Ligating the round ligament of the same side near the uterus, cutting it free, and connecting the two incisions, in order to open up the top of the broad ligament.

"4. Incision through the vesico-uterine peritonæum from the severed round ligament across to its fellow, freeing the bladder, which is now pushed down with a sponge, so as to expose the supra-vaginal cervix.

"5. Pulling the body of the uterus to the opposite side to expose the uterine artery low down on the side opened up. The vaginal portion of the cervix is located with thumb and forefinger, and the uterine artery, seen or felt, is tied just where it leaves the uterus. It is not always necessary to tie the veins.

"6. The cervix is now cut completely across just above the vaginal vault, severing the body of the uterus from the cervical stump, which is left below to close the vault.

"7. As the last fibers of the cervix are severed or pulled apart, while the body of the uterus is being drawn up and rolled out in the opposite direction, the other uterine artery comes into view and is caught with artery forceps about an inch above the cervical stump.

"8. Rolling the uterine body still farther out, the right round ligament is clamped and cut off, and lastly the ovarian vessels are clamped at the pelvic brim, and the removal of the whole mass, consisting of uterus, tubes, and ovaries, is completed.

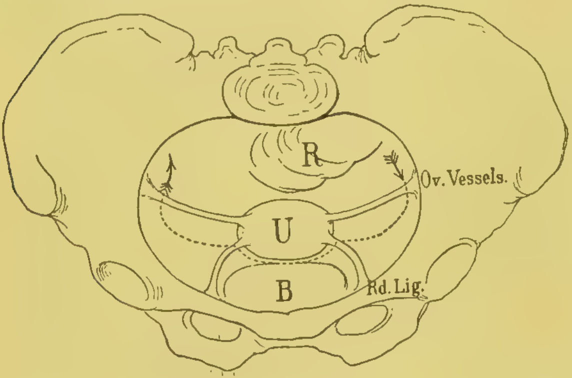


Fig. 186.—Showing line of incision through peritonæum from left to right, through left broad ligament, round ligament, utero-vesical peritonæum, right round ligament, and ending with right broad ligament near the pelvic brim. (Kelly.)

"9. Ligatures are now applied in place of the forceps holding the uterine artery, round ligament, and ovarian vessels; if the surgeon prefers, these may be tied as they are exposed without using forceps.

"10. After the enucleation the operation is now finished in the usual way—(*a*) by closing the cervical tissue over the cervical canal, and then (*b*) by drawing the peritonæum of the anterior part of the pelvis (vesical peritonæum and anterior layers of broad ligaments) over the entire wound area, and attaching it to the posterior peritonæum by a continuous catgut suture.

"The continuous transverse incision should always be started on the side where the ovarian vessels and the ovary and tube are most accessible. If the case is one of a fibroid uterus, and the tumors are developed under the pelvic peritonæum or in the broad ligament of one side, this side should be opened up last, from below upward, when the tumors can be rolled up and out with surprising facility.

"Displaced ureters will not be injured, for on the side on which the enucleation is started such a ureter is pushed down with the loose peritonæum as the uterus and tumors are pulled up and toward the opposite side; and on the other side, no matter how much the ureter is displaced out of the pelvis, as the tumors caught from below are rolled up and out, the ureter drops down with the peritonæum and cellular tissue to the pelvic floor, and the operator need not even see it or be aware of its displacement to avoid the risk of injuring it.

"If the ureter is found to be displaced only on one side, the operation should begin on the opposite side.

"To escape the danger of tying the ureter on the side on which the uterine artery is caught after dividing the cervix, I am careful to put the forceps on the artery well above the cervical stump and to tie there.

"The abdominal incision is always closed without drainage by using a continuous catgut suture for the peritonæum, interrupted silver-wire sutures for the fascia, a buried continuous catgut suture for the subcutaneous fat, and the subcuticular catgut suture for the skin.

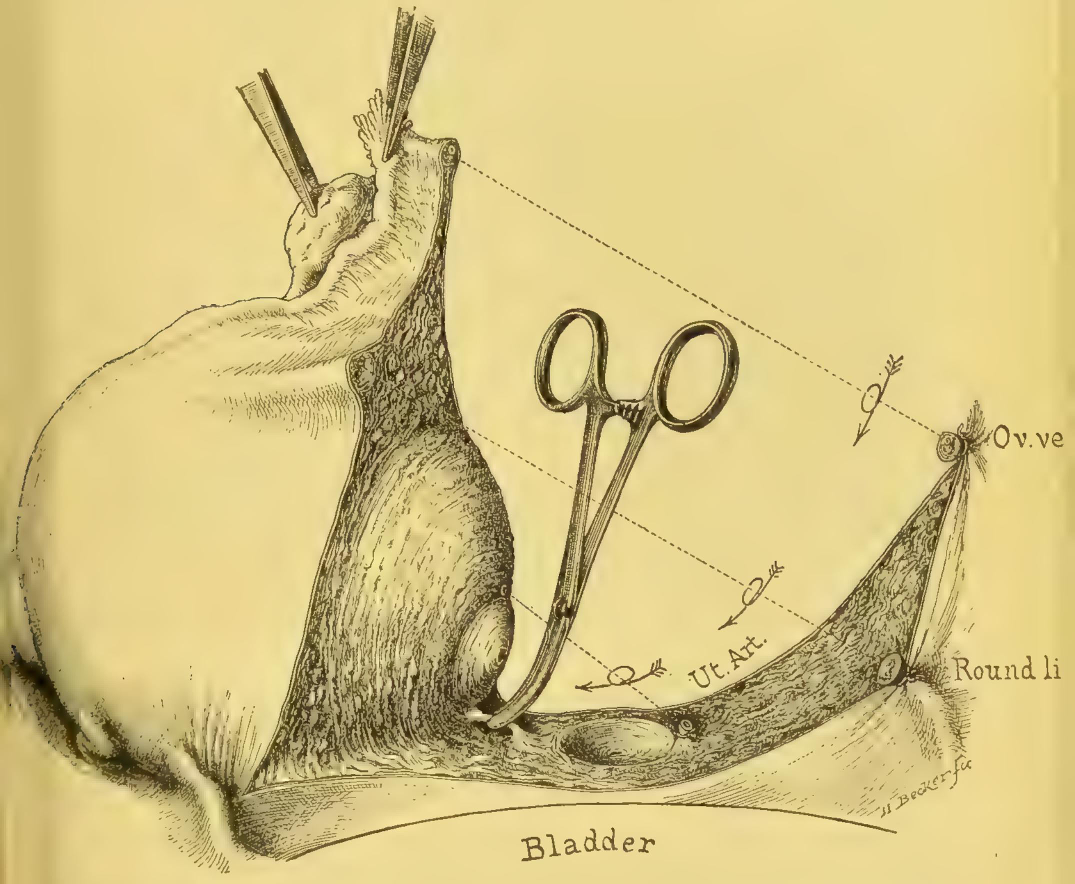


FIG. 187.—Left ovarian vessels tied, left round ligament tied, vesical peritonæum divided and pushed down and left uterine vessels ligated. Cervix amputated and uterus pulled up and out, exposing right uterine artery, which is clamped an inch above the cervical stump. The two following steps are clamping the right round ligament and right ovarian vessels, when the mass is removed. (Kelly.)

"The important points accomplished by this method of operating are (*a*) the great saving of time, and (*b*) the simple way in which certain serious complications are met.

"(*a*) *Time saved.*—According to other methods of operating, half an hour or an hour, or even more, may be consumed in enucleating the tumors and in getting ready to close up the pelvic and abdominal wounds, while by this method the enucleation is often effected in three or four minutes, and in difficult cases in from ten to fifteen minutes.

"The experience of every surgeon will bear me out in insisting upon the importance of saving time at this particular stage of the operation—that is, the stage of enucleation—which is most likely, when prolonged, to produce shock and to be accompanied by excessive loss of blood.

"Furthermore, when the enucleation of the disease is completed, all important questions affecting the vital interests of the patient have been answered; adhesions have been severed, important vessels controlled, intestinal complications dealt with, and tumors developed in situations difficult of access have been removed. In other words, those factors in the case which often demand an alert judgment and the highest surgical skill have all been dealt with; the rest of the operation, closing the pelvic wound and the abdominal incision, follows a certain routine which may with safety be left in the hands of a well-trained assistant.

"(*b*) *Complications met.*—I have insisted particularly upon the novel way in which serious complications are simplified by this plan of treatment, and I would refer chiefly to two kinds of complications:

"First, fibroid tumors located under the peritonæum of the pelvic floor; and,

"Second, inflammatory masses situated behind the broad ligaments, with dense adhesions to the pelvic peritonæum, to the rectum, and often to the small intestines.

"In the case of the subpelvic peritoneal fibroids, it is astonishing how difficult they are to get at from above, and how easily, on the other hand, they roll out when handled from beneath by this procedure.

"I would say the same of the inflammatory cases. Matted masses adherent in all directions which resist enucleation from above are often removed with ease when rolled up from the pelvic floor from below. The adherent structures seem to be unrolled in a natural and easy way, in surprising contrast to the difficulties experienced and the injuries inflicted in gaining the slightest finger-hold in proceeding from above.

"To recapitulate: Abdominal hysterectomy by the continuous incision down through one broad ligament across cervix and up through the other broad ligament, is contrasted with hysterectomy by an incision down to the cervix through one broad ligament, and then down through the other, followed by amputation of the cervix.

"The special advantages offered by this method of operating are:

"1. The saving of from sixty to eighty per cent of the time in the enucleating stage of operation.

"2. The ease with which intra-ligamentary myomata and myomata beneath the pelvic peritonæum may be enucleated.

"3. The ease with which inflammatory masses posterior to the broad ligament may be enucleated by attacking them from below after dividing the cervix.

"4. The control of a displaced ureter, on the side last opened up, keeping it out of the way of injury by the simple mechanism of the operation."

Traction and Morcellation.—Dr. Emmet, I believe, was the first to operate by the method which he calls traction and morcellation.

Intra-uterine tumors that have, in the progress of expulsion, dilated the cervix, but are sessile—that is, attached to the uterus by a broad base—should be removed, be enucleated. That operation is performed as follows: The patient is placed in Sims's position or in the lithotomy position, according to the preference of the operator, and the parts exposed. The capsule is divided at the presenting portion of the tumor with the knife, or, if very vascular, with the cautery. The tumor is seized with a double tenaculum forceps, and, while making traction, the tumor is separated from its attachments by enucleation. A variety of instruments have been invented and used for enucleating, but I have found most of them poorly adapted to the purpose. I use with satisfaction the dry dissector, well known in general surgery, but made larger and longer. The blades are wedge-shaped and rounded on the sides, and one is blunt and the other provided with very fine saw teeth.

The blunt blade or end of the instrument is used in operating upon hard tumors when the capsule is easily separated. The blade with the teeth is required when the capsule is more firmly attached to the tumor. It is always easier and better to enucleate the tumor in mass, and yet when one is too large for this it can be reduced by morcellation. Having completed the enucleation, the capsule should be removed if it does not retract but remains dangling in the cavity of the uterus. That is done by gathering together the edges of the opening at its lower part, seizing it in a forceps, twisting it, and then passing the wire loop around its upper portion and removing it with the *écraseur.*

This is a most important part of the operation. If the capsule is left it may slough, and give much trouble. Again, packing sufficient for drainage is used. This part of the operation should be done quickly, because the uterus contracts in time and makes it difficult to place the packing.

ILLUSTRATIVE CASES.

Fibroma of the Uterus; Recovery without Treatment.—This case illustrates a class, not by any means large, in which the disease runs its course without causing much discomfort or impairing the health to any great extent, and without being influenced by treatment. The patient was highly nervous and very active, had a good constitution, and enjoyed good health. When she was about thirty years old her menstrual flow became more free than formerly. She had up to that time been quite regular and normal in regard to menstruation. This slight menorrhagia continued, and occasionally was quite profuse. She also had backache and pelvic tenesmus, which rendered her less active and enduring than in her earlier life. I first saw her professionally when she was thirty-one years of age. She was then single and enjoying fair health. I supposed that she might have a fibroma of the uterus from the history, and suggested that I should find out by examination the exact condition. This she objected to.

From this onward she continued about the same. The menorrhagia continued, and she had at times dysmenorrhœa and leucorrhœa, but all of these did not impair her health or usefulness sufficiently to make her willing to submit to treatment. At forty years of age she married, and then her symptoms increased considerably, but in the intermenstrual periods she was fairly well. Four years after her marriage she had an attack of malarial fever of a mild order, and then the menorrhagia and dysmenorrhœa became worse, and I then had an opportunity to examine her, and found that there was a fibroma in the posterior wall of the uterus, probably interstitial. She soon recovered from the malaria and its effects, and then her uterine troubles became as they had been formerly. About this time I made an application of iodine to the cavity of the uterus, but as she improved she did not return for further treatment. I saw her occasionally while visiting other members of her family, and heard that she was about the same as formerly.

According to her own statement, she was not at any time quite well, but not ill enough to be willing to be treated. When she was forty-nine she again consulted me, and I then found that the menstrual flow had been diminished for over one year, and had been absent altogether for three months. She was quite nervous and restless, just as many are at the menopause. I examined the uterus, and found that the fibroma had almost disappeared. The uterus was much larger, at least twice as large as it should be after the menopause, but not one third the size that it was when I first examined the case. I have seen her since, and find that she is quite well.

Interstitial Fibroma of Large Size, complicated with Endometritis; treated by Tincture of Iodine to the Endometrium, Ergot during the Menstrual Period, and Mild Continuous Current of Electricity.—A strong and vigorous lady who had always enjoyed good health until after she was twenty-five years old, was first seen when she was thirty-one. She was married at twenty-six, and soon thereafter began to menstruate too freely; she never was pregnant. When first seen she was prostrated with a severe menorrhagia. I then obtained the facts given above, and also learned that she had suffered from pelvic pain, leucorrhœa, backache, and a gradually increasing menstrual flow until the time I saw her, when she was quite exhausted. The uterus and tumor extended upward to half-way between the pubes and umbilicus. Stimulants and ergot were given, but the flow continued, and then the tampon was used, which stopped it. She improved from this time, quite perceptibly, but was pulled down at the next period, though not to so low a point as before. She was then put under treatment for the endometritis. The hot-water douche was tried, and the whole endometrium touched with tincture of iodine. In order to do this it was necessary to dilate the os externum, and then by using the pipette, the application could be made very thoroughly. There was at first considerable catarrh of the cervix, and for that a few applications of tincture of iodine and carbolic acid, equal parts, were made. Under this treatment the menstrual flow became less free, although the tumor increased slightly in size. After remaining under treatment intermittently for about two years, she was induced to place herself under the care of a physician who made the acquaintance of her husband. This gentleman treated her twice a week with a mild continuous current of electricity, which he passed through the tumor by placing one electrode upon the abdomen and the other upon the back.

Three quarters of a year were occupied in this way, but without any improvement; she neither gained nor lost, except that her flow was more free. She returned to my care again, and I resumed the treatment of the endometritis with iodine; I also continued the electricity, but did so by procuring a battery for the patient, and having one of my assistants teach her how to use it. In place of applying it twice a week, as the doctor had done, she used it every day, and I am satisfied that she used it as effectually as the doctor.

This treatment was kept up for two years. Whenever her menses became very free, or if the leucorrhœa returned, she came for treatment, otherwise she used the electricity alone. The tumor had diminished perceptibly, but her general improvement was out of proportion to local changes, excepting that the endometritis was relieved. After this she went to live in the country, and was not seen again until she was forty-six years old. I then found that the menses were normal, and that the tumor was very much reduced. When first seen, I could with ease introduce the sound into the uterus seven and a half inches, while at the age of forty-six the cavity of the uterus measured less than four inches.

Interstitial Fibroma of the Uterus treated with Ergot; Recovery.—This patient was thirty-four years old, married, and had one child when she was twenty-three years old. After its birth she suffered from leucorrhœa and backache, but did not have any treatment until she was twenty-seven years of age. She then began to menstruate too freely, and was treated by her physician, but without effect. The menorrhagia, while it depressed her, did not disable her altogether, so she went about her duties until she noticed a tumor in the abdomen; she then came to me for advice. I found the uterus enlarged, extending upward to within two inches of the umbilicus. The cavity of the uterus was deflected to the right and backward, and the sound passed to the depth of seven inches. The fibroma occupied the left anterior wall and projected considerably to the left, giving to the whole mass (uterus and tumor) an irregular outline.

There was some endometritis, and the patient was slightly anæmic, but otherwise her health was good. Half a drachm of fluid extract of ergot was given before meals, for about a month, in the hope that it might incline the tumor toward the cavity of the uterus, and by partially expelling it bring it within reach for the operation of enucleation. At the end of a month there was no change in the position of the tumor; ergot was then used hypodermically about twenty minims every third day. This excited strong uterine contractions, which lasted for about an hour or more each time. This treatment was continued for three weeks, but without changing the position of the tumor, though it diminished in size. The hypodermic use of the ergot was then given up, because the patient became tired of the pain it caused. She continued to take the quantity first given by the mouth for seven or eight weeks, and the tumor continued to decrease in size. The hypodermic use of the ergot was tried again for nearly a month, but was only used every fourth day. At the end of three months all treatment was stopped because the patient's digestion became impaired. She was kept upon tonic treatment for a time until her general condition improved, and again the ergot was resumed, using it hypodermically and by the mouth alternately. The menorrhagia gradually subsided, and at the end of six months the tumor had diminished over two thirds of its former size. The cavity of the uterus was only three and three quarter inches in depth. No further treatment was deemed necessary. Three years after the treatment was suspended the patient was in good health, and her menses were regular.

The uterus was above the average size, but not much so. The left wall was more than twice the thickness of the other, so that there was a trace of the fibroma remaining, but it was harmless. While the object for which the ergot was originally given was not attained a happier result followed.

The ergot so influenced the nutrition of the growth as to cause dropsy. This is a rare effect of ergot, and yet it sometimes is produced in certain cases.

Submucous Fibroma; Expulsion by the Natural Efforts; Separation of the Pedicle with the Ecraseur; Recovery.—The patient was unmarried and thirty-five years old; she was large, strong, and had always had good health. She began to menstruate at fourteen, and continued to do so in a perfectly normal way until she was twenty-eight years old. At that time the menstrual flow became more free and lasted a little longer. From this time onward, the menstrual flow gradually but not regularly increased, until she established a well-marked menorrhagia. This undermined her health considerably. She lost flesh, and became quite anæmic. She had charge of a branch of a large business establishment, and was an efficient and trusted employé, but her duties became very trying to her, especially at her menstrual periods, at which times she was obliged to stay at home occasionally. Still she persisted in her work until she was taken ill and confined to her bed. She called in a poorly-qualified physician who failed to relieve her; subsequently her employer requested me to take her in charge. I found the uterus enlarged from the pressure of a fibroma, which was evidently intra-uterine. She also had all the signs and symptoms of a pelvic cellulitis in the left, broad ligament. This terminated in resolution, and in about two weeks she was able to be around again. Although still weak, she returned to her duties, but her menorrhagia continued. Every effort was made by tonics and good food to improve her strength. She was requested to rest at her menstrual periods, and to take ergot and cannabis Indica in moderate doses at such times. She continued to be quite anæmic, but dragged along with her work as best she could. I saw her only occasionally, and found that the tumor did not grow very fast, and she did not lose much in general strength. This went on for six years, when she began to have severe pains from uterine contractions; for this I saw her and suggested that she should give up the use of ergot. I did not see her again for about five months, when I was called in haste to her, and found her suffering from great expulsive pains. She told me that it was time for her to menstruate, but she had had very little flow, but instead these extreme pains. Examining the abdomen, I found that the size of the uterus was greatly increased, and that in the absence of uterine contractions, there was distinct fluctuation at the upper third of the uterus. I presumed that the fluctuating mass was a cyst which had rapidly developed since the time that I had seen her before. On making a vaginal examination, I found the cervix dilated about two inches and a solid fibroma protruding at the os externum. Opium was given to ease the pain which was exhausting her, and at the end of twelve hours I found that although the pains had modified a little, they had continued. The dilatation of the cervix had progressed. The opium was continued in large doses. It was then night, and I desired her to sleep. The night was passed fairly well, she had pains, but slept between them. Next day the opium was suspended and the pains returned with renewed vigor. Toward evening, after having several violent pains, they ceased, but were followed by the most distressing pressure upon the rectum and bladder. There was no cessation to this suffering, and I was called in haste to see her. I found the tumor the size of a fetal head, pressing upon the perinæum and firmly impacted in the pelvis. The fluctuating mass was still felt in the pelvis but lower down. Her sufferings were such from the complete obstruction of the rectum and bladder that immediate relief was demanded.

She was at once conveyed to a private room in the hospital, and the removal of the tumor effected. The operation was as follows:

It was impossible to determine the location or character of the attachment of the tumor, nor could I pass the chain of the *écraseur* over it, so firmly was it fixed in the vagina. To avoid incision of the pelvic floor and delivery of the tumor *en masse*—a very bad method which has been practiced—I determined to diminish the size of the mass by exsection with the scissors and forceps. It was night, so I had to use artificial light reflected from the head-mirror. Through Sims's speculum it was easy to cut away enough to enable me to determine that the pedicle was not large, and that the chain of the *écraseur* could be passed. While making this examination, and also while adjusting the chain, there was considerable discharge of dark blood from above the tumor. The pedicle was easily divided, and the remains of the tumor were further reduced, so that it could be brought through the vulva without laceration. The removal of the mass was followed by a gush of dark blood, at least a pint in all, and there were several clots which remained in the vagina. These were rapidly removed, and then I could see the distended and empty uterus. The blood had accumulated in the uterus above the tumor, and given rise to the fluctuation and rapid increase in the size of the uterus which I had observed.

With the light reflected from the head-mirror I was able to examine the entire cavity of the uterus most thoroughly. By holding the lips of the os externum apart with an elevator and sponge-holder, the view of the interior of the uterus was complete. The site of the attachment of the tumor could be clearly seen, and the gradual contraction of the uterus was also noted.

There was nothing of interest in the after-history of the case. The patient made a good recovery, and gradually regained her health and strength. It is now four years since the operation, and she has continued in perfect health.

Uterine Fibroma, supposed to be a Uterine Fibro-Cyst; Death from Septicæmia during the Process of Expulsion.—An unmarried lady of somewhat delicate organization came under my observation when she was thirty years of age; she said that five years previously she began to suffer from menorrhagia, and soon afterward began to observe a gradual increase in the size of the abdomen. When first seen, the tumor was about the size of the uterus at the seventh month of gestation; all the physical signs of a submucous fibroma were obtained. Her general health was somewhat impaired, she was anæmic, owing to the menorrhagia, which was not excessive; otherwise she was in fairly good health, and, as her circumstances in life were good, she was able to be around and enjoy life. She was placed upon a general tonic treatment, with the use of ergot and cannabis Indica, which were given at the menstrual period. She continued for three years to do fairly well, occasionally having an attack of menorrhagia, which pulled her down a little, but she readily recovered from this, and went about in her usual way.

She was seen only occasionally, and the general plan of treatment was not changed.

About the fourth year after she came under my observation, she had an attack of menorrhagia which was rather more severe than usual, and she took larger doses of ergot, and continued the remedy longer than was her habit. This controlled the menorrhagia but produced severe uterine pain, for which I was called to prescribe. I then carefully examined the tumor and found that it had increased in size considerably from the time I had seen her before—about four or five months. I found that the upper portion of the tumor was quite elastic, and that there was distinct fluctuation extending through an area of about five inches. I then suspected a fibro-cyst.

Soon after this she was seen by my distinguished friend, Dr. T. G. Thomas, who, without knowing of the patient's history or my own opinion, made the diagnosis of fibro-cyst. During the remainder of that winter and the next spring she had more menorrhagia, and was kept more continually under the influence of ergot; when summer came she had regained some of her former strength, and went to the country, where she remained for several months. She returned in the autumn slightly improved, but about a month afterward began to suffer from severe pains, due to uterine contractions. These pains increased in severity and frequency, until she was unable to leave her room. She then sent for me, when to my surprise I found the cervix uteri fully dilated and the tumor partially expelled from the uterus, occupying and completely filling the vagina. The ergot was suspended, and she was relieved from her severe pain by the use of opium, but the pressure upon the pelvic organs became so great that it was necessary to try and relieve her. The lower portion or capsule of the tumor began to slough, and I then determined to remove all of the tumor, or as much of it as possible. In the mean time the uterus as examined through the abdominal wall had not diminished very much in size, and the fluctuation was more marked and more extensive. She was at this time very anæmic, and so weak that I dared not anæsthetize her. So I proceeded without doing so, with the patient in Sims's position, and with the aid of Sims's speculum I rapidly removed all that portion of the tumor which occupied the vagina, using the tenaculum forceps and hæmostatic scissors. There was very little hæmorrhage, and the patient derived very great relief from the removal of this portion. She was permitted to rest for a few days and ergot was again given, which produced expulsion of another mass about as large as the one that had been expelled, this was removed in the same way as the other; while removing a portion which extended up into the cervix uteri, about five or six ounces of fluid escaped from the cavity of the uterus. Immediately after this it was found that the fluctuation was greatly lessened, and the size of the tumor, as observed through the abdominal walls, had markedly diminished. She had after this considerable fever and disturbance of the stomach, and this, along with her marked anæmia, prostrated her so that nothing could be done for nearly a week but to sustain her. At the end of that time her temperature diminished somewhat, she was able to take nourishment and stimulants, and as considerable more of the tumor had been expelled, a third attempt was made to remove it. I was able to remove all that portion outside of the cervix; I then endeavored to remove a portion that was still within the grasp of the cervix; as soon as I did this, about four ounces of putrid matter were discharged from the uterus. Although there was not much hæmorrhage, and the patient did not complain of pain, she was so much exhausted and her pulse was so feeble that I was obliged to desist, feeling confident that if I undertook to remove the remainder of the tumor, the patient would succumb. The cavity of the uterus was carefully washed out with carbolized water, and the patient put to bed and stimulated and nourished as well as possible. Two days afterward, when she had rallied considerably, I found that the lower portion of the cervix had contracted around the tumor, and that it was breaking down and decomposing. I thoroughly and repeatedly washed out the inner cavity of the uterus, and hoped by so doing to control the septicæmia from which she was suffering in a most marked degree. I also felt confident that if I could bring her strength up again that I might be able to remove the whole of the tumor. But this proved to be impossible, although the uterus contracted again, in fact, sufficiently expelled the tumor to partially dilate the cervix. She at no time was in any condition to bear so formidable an operation as completing the enucleation of the tumor. The septicæmia still proceeded, and she died about five years from the time that she first came under my observation.

On post-mortem examination it was found that a portion of the fibroma as large as a fetal head remained, and was attached at the posterior and right lateral wall of the uterus, and that it closed the cavity very thoroughly by pressure, and that there was still a little fluid in the fundus uteri. It was clearly evident from this, that this obstruction of the canal below and the distention of the cavity of the uterus above, which gave rise to the fluctuation obtained at her examination, explained the resemblance of the physical signs to those obtained in the uterine fibro-cysts.

It is a number of years since this case came under my observation, and I am satisfied that had I known then as much as I know now about the management of such cases I should probably have been able to save her. As it is, I still think that had she sent for me when she returned from the country, and before her strength became so much exhausted from the efforts at expulsion, I might have been able to remove the whole of the tumor; but it was otherwise.

A Case of Submucous Fibroma in which Pregnancy progressed to Full Time, and the Tumor was completely expelled about a Week after Confinement.—This case was seen in consultation with Dr. Bodkin, who, when called to attend her in confinement, found a solid tumor which so completely filled the pelvis that he could not reach the os uteri. The labor-pains continued, the membranes ruptured, and the cord became prolapsed. The tumor was recognized as a fibroma which extended down into the cervix and at the same time upward toward the fundus. It was a long, narrow tumor which may have assumed that shape by stretching during the growth of the pregnant uterus.

We agreed to try to deliver by version. Accordingly, when the patient was anæsthetized the doctor succeeded in pushing up the tumor out of the pelvis, and passing his hand past the tumor and through the os, which was quite dilatable, he turned and delivered.

I then took charge of the placenta, which was retained for some time. To facilitate its delivery and at the same time to investigate the tumor, I passed my hand into the uterus and was able to make out by bimanual touch the size and location of the tumor. It was oblong, as already stated, and situated in the anterior wall a little to the left side, and extended from the cervix nearly to the fundus, and evidently was immediately beneath the mucous membrane.

The patient did very well considering all things; she had considerable hæmorrhage at the time, and the discharge afterward was free and at times offensive, and she had long-continued after-pains.

About seven or eight days after her confinement she had an attack of tenesmus, and in the hope of obtaining relief she got up to the commode, and by vigorous expulsive efforts expelled the tumor. It was much shrunken, no doubt, but even then the doctor estimated that it was about seven inches in length and three inches in diameter. She subsequently did well.

In this connection it may be stated that uterine fibromata cause sterility, as a rule, owing perhaps to the endometritis which is usually present, and when pregnancy takes place miscarriage generally occurs. Still, I have seen at least four cases that went to full time. In all except the one recorded above the tumors were subperitoneal and not large.

Extreme Dilatation of the Cervix Uteri and Expulsion of a Submucous Fibroma while only Slightly Pedunculated; The Case diagnosticated as Inversion of the Uterus; Operation and Recovery.— This patient came to my hospital clinic and gave a history of menorrhagia for years, and for several months past a metrorrhagia and uterine pain. She was quite anæmic, but had always been well and strong until the excessive menstruation came. She also stated that she visited the outdoor department of the Woman's Hospital of New York, and the gentleman who saw her said that her womb was turned inside out, that she should enter the hospital for operation, and that her case was a dangerous one.

I presumed that the diagnosis made was inversion of the uterus, and on asking the doctor about the case he told me that he believed it to be so. On my first examination I found a tumor in the vagina which, in size and shape, was exactly like an inverted uterus. The mass was covered with uterine mucous membrane. Absence of the fundus and body of the uterus in the upper part of the pelvis was observed by the bimanual touch. That portion of the mass which was uppermost was larger than that which is usually found in inversion of the uterus, but in the center of it there was a slight depression which is generally found in inversion. Passing the sound around the tumor gave evidence that the vagina was attached to the upper part of the tumor, but by pressing the tumor to one side and separating the vagina from it, I could see that there was uterine mucous membrane above the vagina, which extended upward, inward, and over the tumor. By seizing the tumor and twisting it round upon its axis, I also observed that the upper part of the vagina did not move with it as would have been the case if there had been inversion of the uterus. From these signs I concluded that the tumor was a fibroma, with a small but very short pedicle attached to the fundus uteri, and that the cervix and lower portion of the uterus were so completely dilated that the vaginal and uterine walls were continuous.

I presume, that in time, the tumor would have dragged the fundus uteri downward and produced inversion. This has occurred. In fact, it is not an unusual thing to find a partial inversion of the uterus caused by fibromata during their expulsion.

The pedicle was divided with the *écraseur* and the tumor removed. The cavity of the uterus then appeared like a cup-shaped dome at the termination of the vagina. A sponge, in a holder, was gently pressed against the fundus uteri, and held there until the uterus contracted, which it did quite slowly. This was done to prevent a possible inversion from taking place. The patient recovered very promptly.

Soft Fibroma; Atrophy of the Muscular Wall of the Uterus at the Point of Attachment of the Tumor; Enucleation after Dilatation of the Cervix Uteri and Partial Expulsion; Recovery.—The patient was forty-nine years old, married, and had had two children, the last one sixteen years before the time when she came under my care. She was a strong, healthy lady, and had been well until she was about forty-five years of age. At that time she began to menstruate more freely than at any previous time in her life, but being told that it was due to "change of life" she did nothing for it, until she became so weak that she sought advice of a practitioner who treated her locally for ulceration of the cervix which he said she had. She grew worse, the bleeding was more free and lasted longer at each period, and she had a profuse watery discharge at other times. Then uterine pains came on, which she said were like the first pains of labor. This was the history which I obtained when called to see her the first time.

On examination I found the cervix well dilated, and part of a soft fibroma occupying and filling the upper part of the vagina. The pressure gave her much discomfort, and I found that the portion in the uterus was quite as large as that which occupied the vagina. Without giving the patient an anæsthetic, I removed all that was outside of the uterus with the *écraseur*. There was no pain and very little bleeding caused by the operation. The patient being fatigued by remaining in Sims's position I did nothing more for two days, and at the end of that time the larger part of the mass was expelled from the uterus. It was oblong but not pedunculated. All that was protruding from the os externum was removed with the *écraseur*, and the stump was seized with a double tenaculum forceps and enucleated. Traction being made with the forceps the mass was separated from the capsule with a blunt curette. There was very little pain caused until the mass was separated all round and the deepest attachment was reached. Then the patient began to complain. This was fortunate, because it made me very careful. I simply made steady traction and counter-pressure with the curette. When the mass came away I could see the peritonæum very plainly at the bottom of the cavity. My assistant also observed it, and recognizing what it was, he naturally was quite anxious. A space, about the size of a twenty-five cent piece was exposed. It had not been wounded at all, but appeared as if it had separated from the tumor very easily. To make sure that there was no mistake I examined by the touch and found the parts exactly as they appeared to be on inspection.

Submucous Fibroma of Large Size extending through the Uterine Wall to the Peritonæum; treated first by Partial Exsection with the Galvano-Cautery and Several Years after by Enucleation; Recovery.—This was a hospital case which I saw with Dr. Cushing. The tumor was large, and extended down into the cervix on one side and could be easily reached. The patient was suffering greatly from bleeding. Partial excision was made by passing two large curved needles through a section of the tumor, and then passing the wire below the needles, and cutting it off by heating the wire. Section after section was removed in this way, until all that portion which could be reached conveniently was removed, about two thirds of the whole, perhaps. The operation was long, and I did not think it prudent to continue the efforts to remove the whole mass. Recovery from the operation was without interruption, and the patient was much improved. The menorrhagia subsided, she gained her former strength, and was able to make her living as a laundress.

In a few years the tumor had grown again, and all the old symptoms returned and were worse than ever. Dr. Cushing had to see her for several attacks of menorrhagia, which nearly proved fatal. She then came into the hospital. The tumor was nearly as large as it was before, and she was extremely feeble and anæmic. There was a cardiac mitral murmur. The officers of the hospital strongly advised that I should not operate, and I would have gladly followed their advice, but the patient begged that I should try again to help her, and I agreed to do so. The tumor was low down in the pelvis and projected beyond the opposite side of the cervix.

Ether was given, and the pulse improved a little under its influence. The capsule was divided with the thermo-cautery, and separated from the tumor over its exposed portion. A strong forceps was fixed in the mass, and while strong traction was being made the enucleation was performed with the spoon-saw of Thomas. When I had nearly completed the separation, I noticed that there was very little resistance on the part of the uterine wall at the upper part; I then made a bimanual examination and found that I had passed through the muscular coat of the uterus entirely. I was fearful that if I made any further effort to complete the enucleation I might wound the peritonæum. The detached portion was separated from the rest, and the operation stopped. The portion left was about the size of a hen's egg. There was not much bleeding, but I can only say that the patient was living when she was put to bed. The uterus contracted fairly well. There was no further hæmorrhage, but a free discharge of serum continued for a number of days. I felt sorry that I had not been able to remove the whole of the tumor, but was glad that her life had been spared. She improved slowly in strength, and was able to leave the hospital in three weeks. The heart-murmur, which was presumed to be largely due to her extreme anæmia, proved to be due to mitral insufficiency, and although she had no more trouble from menorrhagia, she did not fully regain her strength. She took up her old occupation, but it was more than her strength could endure. A little over two years after the operation she died suddenly of heart-failure. The post-mortem revealed the heart lesions which proved fatal. The part of the tumor which was left had not grown, in fact, it probably had diminished. The scar at the point of the deepest enucleation showed that there was no middle coat of the uterus at the side of attachment of the tumor. These facts proved conclusively that in operating I had gone through to the peritonæum, as I thought I did at the time.

The following cases, treated by hysterectomy, are from the work of Dr. Thomas Keith:

Large Solid Fibroid, Weight, Forty-two Pounds; Supra-Vaginal Hysterectomy; Recovery. (Keith).—Mary C., aged twenty-eight, was sent into the Royal Infirmary by Dr. Robertson, of Ardrossan. She had sought relief in many quarters in vain. The tumor was very large, and was first noticed five or six years before. She was wasted about the chest and arms, like a case of old ovarian disease.

The abdomen measured forty-nine inches at the umbilicus; the tumor was firm and solid throughout. The ensiform cartilage was turned upward, and the growth extended under the sternum and ribs; close to the sternum there was a large projection the size of a child's head. No trace of the ovaries could be detected. The greater part of the pelvis was occupied by the tumor. There was no distinct cervix, only a small triangular projection drawn to the left side, almost beyond reach of the finger. For several years no great inconvenience had resulted; menstruation was never in excess, and for the last fifteen months it had entirely ceased; since then, the increase in the tumor had been rapid, and she could do little or nothing owing to its weight. She sat all day knitting; at twenty-eight, her life-prospects were anything but bright.

For obvious reasons, this patient was not taken down to the large theatre, but was operated on in the ward, on the 18th of April, 1881. Sulphuric ether was given, and the operation was performed under carbolic-acid spray. The sponges, thirty in number, had been lying for a long time in a five-per-cent solution of carbolic acid; they were washed in hot water, and then put into a two-per-cent solution, and wrung almost dry. These were used over and over again, and were not washed in any fresh solution during the operation. Dr. Wilson was present from Glasgow, and there were about twenty visitors and students. The first incision measured twelve inches; it terminated four inches above the pubes, so as to avoid the bladder, which was to be elevated on the tumor. On the right side, the broad ligament rose as high as the crest of the ilium. The left broad ligament was largely spread over the half of the tumor as high up as the ribs. The opening was then enlarged to twenty-two inches, and, by dint of hard pushing and patience, the huge mass was slowly moved forward as far as its connection on the left side would permit.

The right ovary was easily seen. On searching for the left, it was found to be transformed into a long, tense, umbilical-like cord, seven or eight inches in length. Here and there along this tense band were several small cysts. It was so imbedded in the tumor that it never could have been removed. The right, broad ligament was transfixed by soft-iron wires, secured and divided; all bleeding from the tumor was prevented by a series of strong-locking forceps. The fibroid was now more easily dealt with. It was drawn forward, so as to put on the stretch its enormous connection on the left side. About a dozen powerful-locking forceps, ten inches in length, were now applied to the broad ligament before and behind. The whole was then cut downward, and the mass enucleated as low as possible. A strong, soft-iron ligature embraced the base, which was of great thickness.

The tumor was then cut away, the stump showing a section of the cervix in the center. The forceps were removed one by one, and all bleeding vessels separately tied. Some of these were large, and one threw blood over the assistant's head. There was much trouble in finding some bleeding points among the loose cellular tissue of the huge gap now left.

The hæmorrhage was mostly venous. All present could see that the condition was full of danger, and that secondary hæmorrhage into this loose tissue was not one of the smallest risks of the operation. When all oozing seemed to have ceased, the stump (the thickness of the leg) and the end of the right, broad ligament were secured, with much tension, outside; a glass drainage-tube was fixed in above the stump, and the wound closed by forty silk sutures. The operation lasted one hour and three quarters. After much blood and serum had escaped from the tumor, its weight was forty-two pounds.

Ten hours after the operation, five ounces and a half of sirupy blood were removed from the pelvis through the tube. The pulse was 94; the temperature 102·2°; rising two hours afterward to 103·4°. During the night, back-pain was relieved by injections of morphia.

The first day was passed fairly well. In the evening the pulse was 126, and the temperature 102·2°; flatulence was troublesome. She felt weak, and had whisky and water to drink. There were only four ounces of bloody serum from the tube.

On the third morning, the pulse was 120, and the temperature 104°.

On the fourth day, the pulse was 114 to 125; the temperature ranged from 101° to 103·5°.

On the fifth day, after a restless night, the temperature had risen to 106°; it fell to 104°, and again in the afternoon it rose to 105·5.° There was œdema of the labia, and much cellular infiltration in the pelvis. She looked very ill during these days, not caring for food, though taking stimulants freely; on the sixth day the pulse dropped to 92, and the temperature also fell to 101·6°. The tube was removed, there being only a tablespoonful of reddish serum in the pelvis. On the ninth day the wound was found healed throughout. The stump was dry and sweet. The pulse and temperature almost normal.

In the third week there was again a rise of pulse, and of temperature from 101° to 103.° This continued for ten days, and caused some anxiety.

On the eighteenth day, the wires were loose and were removed. The loop was two inches and three quarters in diameter. Seven weeks after the operation she left the hospital. She is now a strong woman, in perfect health, and can do anything.

Soft Bleeding Fibroid; Intra-Peritoneal Treatment of Pedicle; Recovery. (Keith).—In 1876, Dr. Kidd, of Alyth, sent me an unmarried woman—a domestic servant—with a fibrous tumor, low in the pelvis and extending to the umbilicus. She was no longer able for her situation, partly from pain and partly from excess at the menstrual periods. She was twenty-nine years of age, and of fairly healthy appearance. I advised her to delay interference, unless such became absolutely necessary. After three years she came again, very anxious for relief. She was much changed; the tumor now filled the abdomen; she was extremely anæmic, and quite unfit to make her living in any way. The tumor varied much in size: very large and tense before menstruation, much smaller and softer after this was over. The loss of blood was sometimes very great.

Operation was on July 16, 1879. Carbolic spray was used. An incision not exceeding ten inches was made; by taking time, the tumor molded and could be pushed through the opening. Both broad ligaments extended up to the fundus of the tumor on a level with the ribs. The portion containing the ovarian vessels was first transfixed and ligatured, locking-forceps being put on close to the tumor, before the ligament was divided. The same process was repeated on the other side. The tumor was then separated downward all around from its cellular attachments, and a soft-iron wire, secured quite low down—in this case, almost round the top of the vagina—by Koeberle's instrument. There was thus left a large cavity, from which the pelvic portion of the tumor had been shelled out. Koeberle's instrument—five and a half inches in length—was left dipping into the pelvis, as it could not be secured outside. There was little bleeding from the separated surfaces, and the wound was kept as open as possible around the instrument, to allow of the escape of serum.

The operation lasted one hour and a quarter. There was a good deal of pain, and several opiates were required during the afternoon, There was very free perspiration for some days. The highest pulse reached was 124, about thirty hours after the operation; the highest temperature was 100·5°. Recovery was uninterrupted. The serre-nœud came away with the slough in ten days; she returned home thirty-two days after the operation, the wound being quite cicatrized for some days.

The tumor was a soft, œdematous fibroid, and weighed nineteen pounds. This patient has enjoyed perfect health since the operation.

Fibrous Tumor of Uterus, containing an Inflamed, Suppurating Cavity; Operation; Recovery. (Keith).—An unmarried woman, aged forty-four, was admitted into the Royal Infirmary in February, 1874, under Dr. Matthews Duncan. She was a pale, thin, unhealthy looking woman. She had granular, everted eyelids, and was half-blind from inflammation of the cornea. Up till the previous June her health was fairly good. She was then obliged to give up her situation as cook in London, where she had lived for more than twenty years.

Menstruation was regular and normal. Five weeks before admission a tumor was detected. It was hard, elastic, quite fixed, and reached to the umbilicus. The cervix was drawn to the left side of the pelvis; it was almost beyond reach of the finger, and felt as if lost in the tumor. This was supposed to be ovarian. I never had any doubt that the case was one of uterine fibroid, and declined to operate on it.

After two months' residence in the hospital she was dismissed, and went to her friends in the north.

In the course of the summer she began to write letters to say that she suffered severely, and that the tumor had increased. She was importunate, and wished something tried. At last, wearied by her importunity, she was allowed to come back. The tumor had certainly got much larger; its appearance was changed. It was very tender now, and had become prominent on the right side, pushing the loin outward. There was some free fluid. The feeling of elasticity was less marked, while that of a deep, obscure fluctuation was pretty distinct.

The relations in the pelvis were the same, the tumor filling the whole upper pelvis. It was everywhere fixed and immovable. On September 5th, a needle was put in at the umbilicus, and sixty ounces of a dark-brown fluid were removed. This was pronounced to be ovarian. There was little apparent diminution of the tumor. Much irritation followed the puncture, and in ten days the tension was greater than ever. The aspirator was again used; the same quantity of fluid, which was again said to be ovarian was removed. This time much relief followed. She was again sent away, for I had not changed my mind, and still thought the tumor was uterine. She was encouraged to hope that, as menstruation seemed about to cease, the tumor would quiet down.

In a few weeks she was back again, urgent for operation at any risk; her life was miserable from pain, her health had given way, and she had to work that she might live. The case was now quite a clear one for interference, and I willingly agreed to try and remove the tumor, the patient clearly understanding that this might not be accomplished.

On December 12th an incision, twelve or fifteen inches was made at once. The tumor was of a dusky-brown color, covered by enormous veins. It was firmly attached to the right iliac fossa, right lumbar region, and to the wall from a little below the umbilicus. This extent of adhesion quite accounted for the fixed state which the tumor had always presented. Upward of four pints of a dirty, black, purulent-looking fluid were removed, the incision was enlarged, and with one strong pull of the arm, pushed in from behind, the adhesions were broken up and the tumor dragged out. So rapidly was blood lost from huge, torn veins in the capsule, that she became faint. The left ovary only could be included in the wire ligature. From the previous elevation of the cervix, the stump was secured in the lower angle of the wound with less tension than in the first case. This part of the operation occupied only a few minutes, but it was upward of two hours ere the wound was closed. Much trouble arose from stopping bleeding in the torn adhesions, more especially those high up on the insides of the ribs, near the posterior margin of the liver. A glass drainage-tube was left in, passing to the bottom of the pelvis. The patient was pulseless when placed in bed. This was an anxious operation on account of the unusual loss of blood.

It is unnecessary to give details of the slow convalescence. The tube was removed on the fourth day, and the whole amount of red serum that came away did not exceed three ounces. This could easily have been absorbed. The pulse had fallen to below 100 by the fifth day, and there was scarcely any disturbance of the temperature. There was, however, much flatulence during the second and third weeks, also much trouble with the bowels, and at one time there was a fear of obstructed intestine. It was thought—though there was no evidence of this—that there might have been some adhesion at the angles of the bowel, caused by the presence of the drainage-tube. As in the former case, the slough extended far beyond the wire, and a large cavity was left on its separation.

Six weeks later she went home. I saw her quite recently. She was in perfect health, and had been so ever since her operation, now nearly ten years ago.

The application of electrolysis to the treatment of fibroids has been so thoroughly elaborated by Prof. George J. Engelmann, M. D., of St. Louis, that I have with his permission given here a few cases from his work on that subject:

Uterine Fibro-myoma with Menorrhagia, Retro-uterine Hematocele, and Left Cellulitis.—The hæmorrhagic state of this case, the existing inflammation, which was active, subacute, contra-indicated electrolysis or negative electro-puncture. To check the hæmorrhage, positive electro-cauterization was resorted to, the platinum sound connected with the anode in the uterus, the large dispersing cathode upon the abdomen. At the first sitting a current of 60 milliampères was used for eight minutes, no stronger current being admissible on account of the existing inflammation. The effect was good, hæmorrhage and pain lessened. Two days later the treatment was repeated, 100 milliampères used for six minutes; bleeding, which had been almost constant, was stopped. After three further treatments upon alternate days, the menses appeared: previously profuse, now normal in quantity. This symptom being overcome, the inflammatory conditions were attacked by vagino-abdominal galvanism; the negative pole, a large metallic ball covered with absorbent cotton, moistened in warm water applied per vagina, the large plate in connection with the positive pole upon the abdominal surface of the exudation. From 40 to 60 milliampères were so used, serving to relieve the pain. Hæmorrhage and excessive suffering being overcome, the patient was ordered to bed at her home, and directed to continue the use of poultices and hot-water injections until more active measures could be taken for the destruction of the tumor.

Uterine Fibro-myoma (bilobar) extending to one finger's breadth above the navel.

First tentative treatment, May 2d: negative electro-puncture; small stylet introduced to the depth of 3 centimetres; 80 milliampères for five minutes.

Second puncture, May 5th: large platinum stylet introduced to the depth of 4 centimetres; an intensity of 100 milliampères for five minutes; no pain was experienced from the internal electrode, and the abdominal burning diminished greatly toward the end of the sitting.

Third sitting, after an easy menstrual period, May 12th: 80 milliampères, six minutes; highest portion of the tumor 3½ centimetres below the navel.

Fourth sitting, May 24th: 60 milliampères, eight minutes; large stylet introduced to the depth of 7 centimetres; highest portion 5 centimetres below navel.

May 31st, notwithstanding that a current of only 60 milliampères had been applied on account of insufficiency of the battery, local pain followed, the tumor enlarged in circumference, extending above the navel, became tense, swollen, apparently fluctuating; no rise of pulse or temperature. Treatment deferred.

June 2d, fifth treatment: 50 milliampères, six minutes; tumor harder, less elastic, much diminished.

June 7th, sixth treatment: large stylet, 8 centimetres, 60 milliampères, seven minutes.

June 15th, seventh treatment: 60 milliampères, ten minutes; tumor very hard, extending half-way to umbilicus; pelvis, which had at first been almost full, more free; vagina, which had been a fan-like expansion, now assuming more normal proportions. Ice-bag immediately after treatment, since it had answered well when applied during the apparently inflammatory enlargement. The patient returned to her home after the ninth treatment greatly improved in health, functions re-established, the tumor reduced very much in size. Each of the nine sittings had lasted from five to ten minutes.

Uterine Fibro-myoma.—General debility, scanty menstruation. Patient aged thirty-two. A fibro-myoma, similar to the last, filling the pelvic cavity, its left half extending to the height of the navel, the right an inch and a half lower, the uterine cavity possessing a depth of 13 centimetres. This tumor, which had been first noticed in November, 1885, had been rapidly growing, notwithstanding active local and constitutional treatment, mainly with ergot, at the hands of one of our ablest gynecologists, first came under my observation March 9, 1886, recommended to me by her previous attendant, my esteemed friend Prof. Boisliniere.

April 28th, first tentative treatment; the puncture made with a small stylet; a current of 45 milliampères was used for five minutes. Treatment was continued once a week, the puncture hereafter being made with a large platinum stylet through the cervical tissue, and the prominent vaginal projections of both right and left masses, which were punctured to a depth of from 7 to 8 centimetres. For the six treatments following the first, a current of from 100 to 110 milliampères was used; then a still higher intensity, from 160 to 200, was applied. The burning, occasionally intense, often decreased to a minimum toward the end of the sitting (by reason of the anæsthetic effect of the positive pole), the punk- and chamois-covered plate being used, leaving the abdomen, after its removal, sometimes slightly reddened, but always cool. This patient, feeble, subject to fevers, at first did not improve constitutionally. The tumor, after the third puncture, was 3 centimetres below the navel on the left side, 4 on the right—the pelvis more free, a most decided shrinkage, due, I presume, in part to the powerful contraction caused by the high intensity used. In this case free bleeding followed several of the applications, from one to six hours after treatment, after the fourth puncture; coming at one time when still on the table, checked with considerable difficulty by iron cotton tampons. By June 28th the tumor seemed again to increase; her general condition not having improved, menstruation still being excessively scant, a mere show, I endeavored to further constitutional improvement, using no internal remedies, as she complained of her stomach, which had been ruined by constant but ineffective medication; electrolysis was stopped, and negative electro-cauterization resorted to for the purpose of increasing the flow. The uterine cavity then measured 11 centimetres.

July 1st, negative electro-cauterization; 100 milliampères, six minutes. July 12th, 100 milliampères, eight minutes. July 16th, 150 milliampères, ten minutes, no discomfort whatsoever being experienced from the intra-uterine negative pole.

August 6th, menses free, continuing five days; more profuse and better than ever before since first established; she has gained three and a half pounds in the last month; looks much better; feels well. This treatment was continued, with interruptions, during the summer; menses more free than they had been for years; her general condition much improved. No medication whatsoever was resorted to.

CHAPTER XXII.

MALIGNANT DISEASE OF THE UTERUS.

A VERY important, and a very frequent class of diseases is that included in the above term; and for this, if for no other reason, must we have a clear notion of the terminology so often misapplied.

Malignant growths are those which tend to infiltrate and destroy adjacent tissue, to recur after removal, possibly originate remote secondary neoplastic formations, and which cause steady deterioration of the general health without regard to location. They are not necessarily "cancers."

Cancer is an "atypical epithelial neoplasm," distinct from growths of the pure connective-tissue type. Its forms are few and pretty well settled and agreed upon. The first is scirrhus, hard, chronic, or fibrous cancer; the second is soft, acute, medullary, or encephaloid cancer; the third is colloid, "gum," or alveolar cancer; but whether epithelioma is a fourth variety or is itself a distinct form is still a mooted question.

Epithelioma is often intensely malignant; and the term "cancroid" is a safe one as it certainly is *like* a cancer.

Another vexed question is whether cancer of the uterus is a local exhibition of a constitutional malady, or is at first local and only later infects the system generally.

The same uterus may be the seat of several varieties of carcinoma; or, again, the neoplasm may change from one form into another as well without, as after, surgical interference.

Sarcomata are malignant directly in proportion to the lowness of their organization. They are of the embryonal-tissue type.

CANCER OF THE CERVIX.

The body of the uterus is so seldom the seat of carcinosis that when the unqualified phrase "cancer of the uterus" is used, it means of the cervix. Malignant disease of the corpus will be considered separately.

Excepting epithelioma, scirrhus is the most frequent variety, says one class of gynecologists; encephaloid, says the other. They are both right, for I believe the initial stage to be nearly always the hard carcinoma, which subsequently becomes soft and medullary; and since it is only the later form that is apt to produce symptoms sufficiently marked for the patient to consult a physician, this may account for the supposed rarity of scirrhus, as compared with encephaloid cancer of the uterus.

With this idea of the development of the neoplasm in view the pathology will be given.

Pathology.—One lip of the cervix becomes hard, uneven, and hypertrophied, and the nodules, which (probably) originate in the submucous tissue, subsequently ulcerate through the mucous membrane, which is now covered with vascular vegetations, especially near the orifice; the opposite lip suffers an identical lesion, the cervical orifice enlarges and now the whole cervix is covered with vegetations.

The cellular tissue of the vaginal mucosa just beneath this fungoid mass which projects into the vagina, becomes, in its turn, indurated, uneven, and granulated, while, simultaneously, the muscular coat of the cervix is being infiltrated with the growth.

The mucous ulceration is frequently gangrenous, and a fetid fluid, containing shreds of dead connective tissue and portions of vessels which supplied the necrosed part, bathes the surface at the cervico-vaginal junction where the loss of continuity is best marked; and thus a hob-nailed or fungating mass entirely takes the place of what we should normally feel upon a vaginal examination. In very rare cases the carcinomatous mass is removed *in toto* as a gangrenous slough, and then the ulcerated patch that remains is walled in by normal tissue. It is to all appearance, a phagedenic ulcer.

Microscopically, a section of scirrhus shows small cavities (alveoli) surrounded by thick fibrous stroma, and in the alveoli are only a few polyhedral cells.

An encephaloid section exhibits a delicate and scanty framework surrounding large alveoli which are crowded with cells (many of which are fatty) in a milk-white fluid, the "cancer-juice." The section from such a tumor is light in color and mottled. In the vessels are plugs made up of cancer-cells and fibrin; the walls of these vessels are pigmented and fatty.

Either variety is melanotic, when the blood pigment in the stroma and alveoli is so rich as to produce a deep brown or black hue.

Finally, one of the rarest forms of carcinoma uteri is colloid cancer; the difference between it and encephaloid (of which it is a modification) is that the cells enlarge and are filled with colloid material, the alveoli enlarge also, and as the stroma thins, one cavity communicates with another so that anfractuous spaces are formed filled with a transparent gum-like substance.

The pathological effects of cancer of the womb are many and important. It may extend to, and perforate through the vesical wall; this occurs oftener than one out of three cases, and cystitis always precedes the rupture.

Vesico-vaginal fistulæ are by no means uncommon, and here we shall often find severe gangrenous processes attending.

Rectitis may be excited and the wall of the rectum be perforated. These are not half so frequent as bladder lesions. When, however, both structures are opened there is a cloacal intercommunication of vagina, rectum, and bladder.

When stenosis of the ureters results either from external pressure or from thickening of their walls, we will find the kidney anæmic and full of urine (hydronephrosis).

The cellular tissue of the broad ligament and iliac fossæ is infiltrated, and, later, undergoes purulent infiltration, frequently inducing peritonitis, while the vessels and lymphatics leading to such purulent collections are the seat of carcinomatous inflammation.

The peritonæum of Douglas's *cul-de-sac* is pushed upward and pseudo-membranes inclose the uterus both anteriorly and posteriorly.

The subperitoneal connective tissue of the true pelvis is thick, hard, and adherent to the bones; it may press on, and cause fatty changes in the sciatic and pelvic nerves.

The body of the uterus may be infiltrated, the organ being as large as when pregnant. Its walls may measure one and one half inch in thickness.

The tubes are rarely involved; and if carcinoma be located at first solely in the cervix the ovaries always escape.

When cancer proliferates downward in the vaginal walls it forms numerous nodes, as far as the introitus vaginæ, so that a physical examination will become difficult or impossible.

EPITHELIOMA OF THE CERVIX.

Cancroid, formerly called rodent ulcer of the cervix, is not so malignant as scirrhus or encephaloid carcinoma. It seems to be of a more local character than the other neoplasms of this group.

It appears in one of two forms—as pavement-celled epithelioma or as cylindrical-celled epithelioma. Excepting colloid cancer, this last is the rarest form of uterine neoplasm.

Pathology.—Pavement-celled epithelioma begins in the epithelia of the vaginal portion of the cervix, the tumor formed being waxy, slightly vascular in spots, and dry on its surface. The mass is friable ("fragile cancer"), and on pressure we can squeeze out white worm-like plugs, composed of epithelial cells.

I have occasionally found this variety to begin within the cervical canal, and extend outward (not downward), so that on exploration the mass could be scooped out, leaving the cervix a mere shell, its exterior or vaginal portion showing few if any signs of new growth.

The tumor is lobulated, and, when the lobules compress the vessels, gangrene results, and all that part of the cervix that is carcinomatous may drop off, or a deep, crater-like ulcer is excavated whose edges are always nodular; hence the term "ulcerating epithelioma."

Squamous epithelioma extends to the body and fundus, but in general its spread is limited by the nearest chain of lymphatics.

Microscopically, a tubular structure is often seen, the tubes being surrounded by a fibrous material, and probably originating from the *culs-de sac* of the cervical glands.

The appearance of the section has given the name "cystic epithelioma" to it. When the tumors are crowded with lobulated nests of cells, connected together with epithelial bands, the centers are filled either with colloid matter or a hard mass resembling ordinary callous (such as that on the hand or foot).

Cylinder-celled epithelioma originates as a pedunculated or sessile vascular wart; and, although the dendritic tumor begins in a single spot, it tends toward the vagina in its growth, and spreads downward as the so-called "cauliflower excrescence," often as large as a hen's egg, and not rarely completely filling the vagina.

The glands are so distended that the French pathologists call this "adeno-carcinoma."

At first the cylinder cells of the cervical mucosa form a soft mass, with a milky juice; thus it is hard to differentiate it from encephaloid except by the aid of the microscope.

Non-malignant papillomata also resemble these vegetating epitheliomata, and, without a microscropical examination, whether a cauliflower excrescence is or is not malignant can not be determined. With such an examination the non-malignant is seen to lie upon healthy submucous tissue, the malignant upon unhealthy; the non-malignant is a simple anastomosing framework, while the malignant growth has an alveolar arrangement with cell-nests.

This form of cancroid invariably ulcerates; and, though occurring late in the disease, this process is rapid and destructive, large vessels often being eroded.

Microscopically, it consists of numerous long stems, all interconnected, each stem having at its center a vascular loop, the exterior covering being long cylinder cells; thus it is like an intestinal villus, only longer, and the numerous vessels among the masses of cells permit serum to ooze through their walls, and this is the chief source of the watery discharge of this disease.

The points of secondary invasion are many; the bones, lungs, liver, bladder, rectum, pelvic nerves, adjacent lymphatics, and the uterus have been the loci of later malignant growth, and in the uterus it occupies the fibro-muscular structure as numerous and partially distinct nodules.

Symptomatology.—Malignant disease of the womb runs no typical course. As with cancer elsewhere, so here there is a stage where a tumor is forming, and a stage where it ulcerates.

During the first of these stages the amount of pain, the leucorrhœa, and hæmorrhage are so slight that few patients will consult the physician about them. And, as I have said, it is probably for this reason that scirrhus is considered a rare form of cancer. And let me say at the very outset that the lancinating pain so often mentioned all through our literature as strongly symptomatic of carcinoma uteri is exceptionally met with in this disease.

A discharge is the earliest symptom in the majority of cases. This discharge may be bloody, watery, or leucorrheal. As a rule it assumes the character of an intense menorrhagia, the patient also bleeding between the menstrual epochs either spontaneously or from sudden exercise or coition. Some women will state that although their change of life occurred a year or so ago, that now they have "commenced again."

The bloody discharge may or may not be fetid and grumous, but the organic matter which forms the grumous discharge, and which is continually sloughing away and passing out of the genitals, very seldom causes any septicæmia. Besides, the lymphatics are not here abundant in the immediate neighborhood of the cancerous tumor.

Watery discharges consist chiefly of the clear serum of the blood; they are usually odorless at first, but soon become mingled with ulcerative *débris*, and are peculiarly foul smelling. They are seldom or never free from admixture of blood, and there are very few who will not give "bloody water" as one of their chief symptoms.

The watery flux is almost characteristic of the cauliflower excrescence.

In many cases the discharge is simply leucorrheal up to the time of ulceration of the cancer, after which the fetid "cancer smell" and molecular masses from the growth indicate the true cause of the discharge.

A sudden bright hæmorrhage indicates that a medium-sized artery has been opened.

The more rapidly the neoplasm forms, and the more extensively it ulcerates, the more profuse and fetid will be the discharge.

Excoriations, erosions, erythema, vaginitis, vaginismus, intense pruritus, and similar conditions may result from the passage of these discharges through and over the genitals.

Pain is never so prominent a symptom as the discharge, and, according to some, never a symptom so long as the cervix alone is the seat of malignant growth. The character of the pain is described differently by different patients, as dull, boring, gnawing, shooting, and stabbing.

The pain shoots in the direction of the parts supplied by branches of the nerve whose main trunk is pressed upon. The back, pelvis, and thighs are the chief regions of this kind of pain.

The pain is more acute when the terminal nervous branches are involved than when the trunk alone is compressed; and it is, again, more severe when there is a large amount of neoplastic tissue formed than when ulceration is extensive.

The pain of peritonitis, which may be lighted up by the growth, has characters peculiar to itself.

The amount of tenderness is not always in proportion to the pain.

Pain on motion and from coition (dyspareunia) is experienced almost from the onset in neoplasms of the cervix; later on, defecation and urination may produce intolerable suffering. Pain as a symptom may be absent throughout the disease, and the patient only experience weight and bearing down.

As the disease progresses, the patient first loses strength, appetite, and all cheerfulness of disposition, emaciation following later on. The face assumes an earthy green, or, toward the end, a bronzed hue, and the temperature may be slightly subnormal. There is somnolence and headache, but eclampsia is infrequent.

The bowels are constipated, as a rule, but irritation or actual cancer of the rectum may cause profuse and exhaustive diarrhœa; hæmorrhoids are common. Cystitis, strangury, and retention or incontinence are not infrequent bladder symptoms.

When fistulæ form, they give rise to their usual symptoms. In one case the first, and, indeed, the symptom on which the diagnosis was made, was a flow of urine from the region of the cervix.

The breasts are frequently the seat of sympathetic pain. Toward the close of the disease there is usually a slight febrile movement in contrast with the temperature in the early stages of the disease.

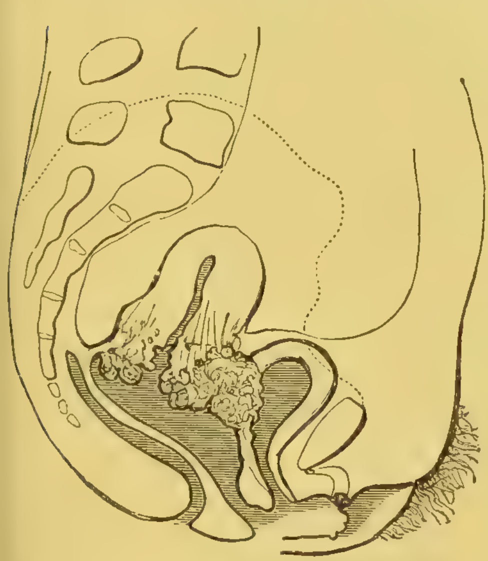


FIG. 188.—Cancer of both lips (Winckel).

Physical Signs.—Scirrhus carcinoma gives a hard, hobnailed or nodular feel to the finger during the earliest stages, and the mucosa seems to be immovably fixed on the subjacent connective tissue, a condition not met with except in malignant growths.

When any cancer has ulcerated (the usual time when the physician sees it), the finger meets a friable, irregular mass, which bleeds upon the slightest provocation, and which is surrounded by a tough, unyielding, irregular zone of infiltrated tissue. If reached, the lips of the cervix are felt to be uneven, thick, and spreading downward like a mushroom.

Palpation may further reveal in many cases fistulæ, immobility of the womb, changes in the size and position, and infiltrations and indurations in the neighborhood.

In scirrhus the womb is felt to be low down in the pelvis.

The bowels may have been so constipated that the physician examines for stricture of the rectum before searching for anything else; but in doing this he will directly suspect the true state of affairs, and especially so if the pelvic cellular tissue or neighboring glands be involved.

A second physical sign, which is supposed by some to be diagnostic, is that a sponge tent or uterine dilator fails to dilate a cervix suffering from malignant disease, whereas in all other neoplasms dilation will quickly and easily follow its introduction.

A third physical sign is indescribable; it is the odor that the finger has after such an examination—an odor produced by nothing else but cancer.

A fourth means of physical diagnosis is the speculum, by the use of which we see what has already been described under the head of pathology. Commencing scirrhus is accompanied by a deep purplish or livid hue of the entire cervix, and enlarged vessels are seen to ramify about these nodules.

The extent of the growth can only be accurately appreciated by this means of examination. Epithelioma of the cervical cavity is often diagnosticated solely by the use of the speculum and curette or probe.

Lastly, the microscope may be used not only to diagnosticate the presence or absence of carcinoma, but to decide which variety we have to deal with. It should be stated here that malignancy can not be decided by the microscope, since it is a clinical property.

The microscopical appearances of each form have already been described.

Diagnosis.—Before treating of the points in which cancer and other lesions of the uterus differ, it is necessary to mention the characters that especially distinguish one form of carcinoma from another.

Scirrhus gives a nodular, hard sensation on palpation, immobility of mucosa upon sub-mucosa, prevents cervical dilatation on using the sponge tent or the uterine dilator, showing less of elasticity in the tissues, and the discharge is scanty.

In medullary cancer the grumous discharge containing molecular *débris* is the prominent symptom. The course of this cancer is the most acute of all. The brittle, crumbling, ulcerated mass is peculiar to this form. The uterus is usually fixed and immovable.

Epithelioma is accompanied by a more profuse watery discharge than any other variety; and on palpation the finger meets, often, the characteristic cauliflower-like mass. The uterus even late in the disease suffers no fixation, and may be moved without pain. This variety seems more local than the preceding.

In all instances when cancer is diagnosticated a microscopical examination will determine what variety we are dealing with; and to this end a piece of the tumor may be removed by the curette.

There are numberless conditions with which cancer in general may be confounded; the chief of these are:

Sloughing Myomata or Fibrous Polypi.—These may, either of them, simulate cancer; but they will be attended by fever, which is absent in cancer, and there will be in the discharges shreds of the normal uterine tissue, while in cancer discharges epithelial cells will be prominent. Frequent washings control the former, while cancer remains unmodified thereby.

Syphilitic Ulceration.—This not only resembles cancer, but may even produce vesico-recto-vaginal fistulæ. Here the history, the age of the patient, the effects of local and constitutional treatment, the discharge, and an examination of a small bit of the tumor will soon allow a diagnosis to be reached.

Condylomata.—These will not long be mistaken for cancer.

Erosions.—These are numerous; but non-malignant erosions occur in younger patients, produce no constitutional symptoms, leave no portion of the cervix intact, are attended with large, gaping fissures, and, on inspection by means of the speculum, large ovula Nabothi are seen. The discharge does not have the cancerous odor in benign erosions.

The points in connection with cancer of the body and cancer of the cervix are considered hereafter.

Prognosis.—It is needless to say that the invariable tendency of malignant uterine disease is toward death. The chief question in prognosis, therefore, is of the duration of life. There are no hard and fast rules for the expectation of life, nor do my own statistics or those of others afford definite statements.

Three months and three years are the extreme figures given.

In general, it may be stated that, after the first marked symptom (some discharge), the patients live a year, except those who have epithelioma or cancroid; these, as a rule, have eighteen months of life before them.

A prognosis should never be made immediately after diagnosticating cancer; the physician should wait until the disease pronounces itself a slow or rapid, an uncomplicated or a complicated, a localized or an extending process.

Among the complications are hydronephrosis (see pathology), and, consequently, uræmia, cellulitis, and peritonitis, and, less frequently, septicæmia, phlebitis with venous thrombosis, embolism, and cancer in adjacent tissues and distant organs, the liver especially.

Death may result from simple exhaustion (cancerous marasmus), or from hæmorrhage when a large vessel is opened, or from rupture of the uterus (rare), or from any of the above-named complications.

Death is sometimes delayed and torturing, and, in the face of its being inevitable, it often seems as though it were a mercy to hasten it.

Etiology.—Until puberty the death-rate from cancer is the same in both sexes; from this period both frequency and death-rate steadily increase in the female up to and a little after the menopause, at which period the difference in rate between the sexes is most marked. After the age of fifty there is a tendency for cancer to appear equally often in both sexes.

There is no doubt but that there is such a condition as a predisposition to malignant disease; but to what extent this can be inherited or not is not yet determined. It is well known, however, that certain peculiarities of organization predispose to malignant disease. Among these is the cardio-vascular hypoplasia (Virchow), where the pulmonary arteries are undersized, and which occurs often with the phlegmatic temperament, characterized by an abundant adipose tissue and an appearance of health, which is an appearance and nothing else.

Great differences are met with in authorities as to the frequency of cancer; reliable statistics, however, tell us that the uterus was attacked in three thousand cases out of a total of sixty-one thousand seven hundred and fifteen cases of carcinoma (anywhere in the body) in females. The same also afford us proof that the uterus is cancerous three times as often as any other female organ.

Heredity has an undoubted influence; I have gathered the statistics of many thousand cases, and find that an inherited taint can be traced in thirteen per cent of all cases on an average.

Age is the most potent factor in the etiology. Before puberty, indeed before the age of twenty, cancer is unknown or phenomenal. I have seen two cases—both ending fatally—where the patients were in their twenty-seventh and twenty-eighth year respectively; and the sister of the last named died of cancer of the uterus in her thirty-first year.

The ten years following the menopause (forty to fifty) is the period of carcinoma uteri; the decade following this is the next most eventful period, and third in order stand the ten years preceding the climacteric.

Race seems to have little or no influence. Perhaps it is peculiar to my practice, yet I have seen more cases of carcinoma uteri among Germans than in any other nationality.

There is more than an accidental agreement between cancer and the number of children born; for it will be found that patients with cancer of the uterus will average one third more children than women free from malignant disease of the womb; indeed, every case of carcinoma uteri will average five children, a large family at the present time.

Prolonged lactation, anti-hygienic surroundings, poor or improper food, exhausting diseases, grief, and anxiety are all more apt to be accompanied by cancer than an opposite condition of affairs; nevertheless, seventy-five per cent of cases will give a history of good health up to the development of this neoplasm.

It is quite certain that laceration or erosion of the cervix has a causative influence upon cancroid; hence in suspected epithelioma the previous history must always be elicited. I do not mean that laceration will cause it; but with a latent tendency, an erosion or laceration will often determine the precise point of eruption of the disease.

In recent times pathologists have favored the idea that cancer is dependent upon a certain germ. When this comes to be better understood, it is possible that medical treatment may be sufficient to prevent or to cure this affection. But at the present time our knowledge of the disease appears to be limited to the fact that certain organizations are predisposed to cancer disease; and if it should be found in the future that the disease is due to a cancer germ, the fact will still remain that, in order that this germ may be effective in producing cancer, a certain kind of organization or a certain quality of tissue is favorable to the action of this germ. It is known that the tubercle bacilli (and the germ of cancer, if there is one), require a certain kind of tissue to live upon, hence some enjoy an immunity from these maladies, while others are predisposed to them.

Some of the diseases due to specific germs attack all alike, the strong and the weak—typhoid fever, for example. It is very different with such diseases as cancer. Those germs that require special tissue to live upon act locally. The other germs that attack all organizations are general in their action.

There are certain things that we know now which obtain almost invariably in cases that develop cancer—such, for example, as the fact, pointed out long ago by Virchow, that the pulmonary artery is abnormally small in those who die of cancer. I have kept a record of a very large number of cases of cancer of the uterus, mammary glands, and ovaries, and I think I can say that, without exception, I have found the pulmonary circulation defective, and consequently respiration and blood aëration insufficient to a certain degree.

The vast majority of subjects, also, have been stout, with a preponderance of adipose and cellular tissue. In fact, they have been somewhat chlorotic as a rule, and of the lymphatic temperament. In short, while digestion and assimilation have been normal, disassimilation, disintegration, and elimination have been imperfect or sluggish. It would seem, therefore, that this condition of organization predisposes to malignant disease; and if such is the fact, then much can be done in the way of development and general management in early life to overcome this peculiar tendency to disease. All that was said in discussing the management of chlorotic and phlegmatic girls would apply with equal force to the prevention of cancer. I need not, then, in this connection, dwell upon that part of the subject.

The condition of the organization at, toward, or immediately after the menopause especially favors the appearance of cancer.

The diagnosis of this condition is based upon the special temperament, usually phlegmatic, somewhat chlorotic, it may be, with small circulatory apparatus, at any rate so far as the pulmonary artery is concerned, and hence the imperfect respiration and blood aëration referred to, the superabundance of adipose and cellular tissue, as shown by the general appearance of the patient, with sluggish excretion or elimination, indicated chiefly by renal and hepatic torpor. These conditions of ultimate nutrition are very often spoken of as lithæmia, and hence I might say that lithæmic patients at this period of life are predisposed to cancer.

It will be seen that this condition may be largely due to inherited temperament and general organization, and yet to a large extent it may be acquired. Some of the modifications of nutrition which have been referred to in discussing the menopause clearly eventuate in this predisposition to malignant disease.

Dr. Arthur W. Johnston (in whose opinion I have profound confidence) believes that the chief cause of carcinoma is failure of the trophic nerves, the failure being brought about by some nerve strain or great sorrow. I accept without hesitation the theory regarding the causative relation of the trophic nerves to cancer, but my clinical experience makes me doubt if nerve strain is the primary cause. I incline to the opinion that failure of the trophic nerves occurs more readily in those organizations which I have described as predisposed to malignant disease. But whether the nerve strain is a necessary element in the causation of cancer or not, the trophic nerves, which preside over all tissue changes, certainly play an important part in the ætiology of cancer, and have a certain bearing on the question of treatment.

Treatment.—This may be divided into the medical and surgical.

The first indications in this condition are to improve the character of the tissues, first by diet, and then by every possible means which can favor ultimate nutrition by promoting the depleting processes, or disintegration and elimination.

In regard to the matter of diet, I am confident that all the articles of food and drink which retard tissue waste or elimination of worn-out tissues, such as alcohol (especially in the form of beer), tea, and coffee, should be avoided. Certain observations that I have made lead to the conclusion that beer-drinking people, and to a less extent wine-drinkers, are more subject to cancer. This is an additional reason for my urging the restricted use of such articles through life, and especially at the time when cancer is likely to appear. The excessive use of animal food, while it may not in itself predispose to malignant disease, does so when it is used in excess in connection with alcohol; and those who take sparingly of animal food, I find, can bear a larger amount of alcohol with less injurious effects. And so, in given cases, if I found that they took animal food sparingly, but alcohol in considerable quantity, I should continue the alcohol but diminish the quantity. It is, I presume, on account of this effect of animal food and alcohol in producing a tendency to cancer that milk diet has obtained a considerable reputation in the management of malignant disease.

Next to diet, every means should be employed to regulate the renewal of tissue; and, first, by getting clear of waste material. Diet having been properly adjusted, and food given in quantities that can be easily and thoroughly digested, will insure the best possible supply of tissue. Then if, by the means at command, free disintegration and elimination can be secured, much will be accomplished toward preventing the appearance of cancer. The bowels should be kept regular, and yet not unnecessarily free. The kidneys should be made to do their whole duty, and the intestinal secretions, including hepatic secretion, should be carefully looked after. The skin also requires attention; and here I believe the Turkish bath is of value, especially to those who have not sufficient exercise to induce free, healthful perspiration. A Turkish bath once or twice a week, with thorough massage, will greatly improve the ultimate nutrition. Exercise should be carefully regulated. It is a rare thing to see cancer in an active person who does not carry a superabundance of adipose tissue, and who takes a sufficient amount of muscular exercise, and yet not too much. If diet, exercise, and eliminating agents be employed to excess, so that the renewal of tissue is insufficient, and the patient becomes debilitated and suffers from lack of nutritive supply, the tendency to malignant disease will be favored.

Care must always be taken not to overdo the eliminating process. The balance between waste and repair should be maintained as nearly perfect as possible, the great object being to secure complete ultimate nutrition, so that the tissues may not become too old and worn out before they are broken down and thrown off. I am not sure that I will be thoroughly understood when I speak of old tissues, but I apply the term to a condition in which the process of waste and repair is retarded, and the tissues are not broken down and thrown off after they have served their purpose. That is what I mean, and that is the condition which I believe favors the appearance of cancer, and the chief thing to be overcome by treatment directed to prevent it. Dr. Johnston's views regarding causation suggest the necessity for the use of agents that may improve the condition of the nervous system. This, of course, is largely accomplished through improvement of the general nutrition, but nerve tonics, and sedatives if needed, should be employed.

This leads up to the consideration of medicinal agents which are supposed to have some influence on the ultimate nutrition, and which have been used in the past, in the hope of preventing cancer or of arresting its progress when it has manifested itself in any location.

A number of remedies have been employed in the past, and we may say of most of them that they have been weighed in the balance and found wanting. At one time condurango, Chian turpentine, and several others, were lauded for their curative power in cancer, but they have been found, if not useless, almost so. Those that are used most at the present day, and which still claim some confidence, are prepared chalk and arsenic.

In regard to the chalk, which was first used in the form of calcined oyster shells, given in powders, ten to twenty grains, three times a day, there were several theories regarding its action, but whether they were correct or not is unknown. From personal experience I am unable to say that this agent is reliable. As it is a harmless article, I can see no objection to using it; but I would rely far more upon arsenic. Arsenic has a decided influence upon ultimate nutrition, especially of the skin and mucous membranes; and as cancer usually makes its appearance in those tissues, anything that can improve their nutrition must be of some benefit. Such is the fact, based upon the therapeutic action of arsenic, and the same thing is observed clinically. On this account I have employed this remedy in the management of the conditions which I believe predispose to cancer and in cases where cancer actually had appeared, and with benefit. On the same principle I have employed mercury and iodine, a favorite prescription being small doses of chloride of mercury with arsenic, continued for a time and then changed for iodine and arsenic. Small doses of the latter, and also of the mercury, should be employed, as it is a long-continued action which gives the result.

These are the remedies that at the present time are most efficacious, and I believe that if persistently continued, and if begun early in the course of the disease, but more especially if employed when there is an apparent tendency to the disease, they are potential preventives—at any rate, the best there are. When cancer is present, I need hardly say that surgical treatment is indicated, and is the only treatment that promises any relief.

Within the past few years much has been said with reference to the effect of pyoctanin, an aniline preparation. This, I am satisfied, is of some value in arresting the progress of the disease when applied locally, but this belongs to the domain of surgery. What effect it may have when given internally is not decided.

A word may be said regarding the treatment of cancer by local applications in the way of plasters and caustics, and so on. This, of course, is surgical treatment, and the most barbarous kind of surgery, and so nothing further need be said on that subject.

It sometimes happens that, after the surgeon has done his best for the relief of malignant disease, his efforts fail, and the patient falls into the hands of the physician in her last days. There is only one word to say on that subject. Under these circumstances the physician's first and only duty is to give relief and add to the comfort of the patient as far as possible. Opium is the agent which alone can do this, and I believe in the free use of it in the management of such cases—doses sufficient to relieve pain. I may add that I believe that not only does opium relieve pain in cancer, but it retards the progress of the disease. I have an idea that the habitual use of opium prevents cancer to a limited extent.

All that has been said in this connection applies equally to cancer of the uterus, ovaries, or mammary glands, which covers the whole field of the gynæcologist.

Surgical Treatment.—Complete removal of all the diseased tissues is the classical treatment of cancer of the cervix uteri. In the past this was accomplished in several ways—by caustics, amputation with the knife, ablation with the curette and thermo-cautery, and in recent years with the galvano-cautery by Byrne's method.

Since vaginal hysterectomy has been perfected, the vast majority of surgeons prefer to remove the entire uterus when cancer is found in any part of the cervix or body.

Having had ample opportunities for observing the safety and superior results, immediate and ultimate, of Dr. Byrne's operation for cancer of the cervix uteri, I believe that it is preferable and should be adopted. Many surgeons who adopted Byrne's method complained of having trouble with the battery, owing to their not knowing how to keep it in order. There is nothing reasonable or valid in such objection, and now that the electric-light power is in most of the hospitals and houses and can be utilized for running the cautery instruments such objections can no longer be raised. The cautery instruments devised and used by Dr. Byrne are to be found at the instrument makers, and therefore I need not describe them here. The method I prefer giving in the doctor's own words:

High Amputation of the Cervix Uteri in Cancer.—" In conditions admitting of high amputation, the following is the method usually resorted to: The uterus is to be exposed and the vaginal walls protected in the manner already described. The diverging volsellum being passed well into the cervical canal, should now be expanded to a proper degree and locked, so as to afford complete control of the uterus during the entire operation.

" By alternate traction and upward pressure of the uterus an accurate idea may now be obtained as to the proper point to begin the circular incision, so as to avoid injuring the bladder or opening into the *cul-de-sac* of Douglas. As to the latter, however, should it be found that the disease has involved the retro-uterine tissues, and that its excision or destruction by the cautery can not be effected without opening into the peritoneal cavity, there need be no hesitation in doing so, as I have never known any harm to come from it whether done accidentally or by design. Should it be evident at the outset that the operation, in order to be thorough, must include a portion of the *cul-de-sac*, it will be better to make the line of incision anterior to this, until the cervix has been removed, and leave the excision of the retro-uterine parts by the cautery knife to be the final proceeding. Under these circumstances all that will be needed will be an antiseptic tampon properly applied.

" In proceeding to make the circular incision, the cautery knife slightly curved and cold, should be applied close up to the vaginal junction, and from the moment that the current is turned on should be kept in contact with the parts being incised. Before removing the electrode for any purpose, such as change of position or altering the curve of the knife, the current should be stopped, and the instrument again placed in position while cool before resuming incision. In other words, if the knife, though heated only to a dull red, be applied to parts at all vascular, hæmorrhage more or less will certainly follow ; whereas, the cool platinum blade being already in contact with moisture as the current is being transformed into heat, vessels are shrunken or closed even before they are severed.

"This is a very important point, and should never be lost sight of in all cautery operations.

"The circular incision having been made to the depth say of a quarter of an inch, it will now be observed that by increased traction the uterus may be drawn much farther downward, and by directing the knife upward and inward the amputation may be carried to any desired extent. In cases calling for amputation above the os internum, it will be better to excise and remove the cervix first, then, by dilating the upper canal sufficient to admit the diverging volsellum, once more proceed as in the first instance, taking care, however, to keep within bounds. It will be found that the cupped stump can now be drawn down and made to project as a more or less convex body.

"In all cases the dome-shaped electrode should be passed over the entire cavity repeatedly, so as to render the cauterization still more complete.

"It is important to add that, in carrying the knife toward the sides of the cervix, circular and other arterial branches are apt to be encountered, and hence, in this locality particularly, a high degree of heat in the platinum blade is to be carefully avoided. As an additional security against hæmorrhage, the convexity of the knife should be pressed against the external surface of each particular section cut, so as to close vessels more effectually.

"It is well to state that the metallic parts of the electrode for the distance of about two inches should be covered with a strip of thin flannel, so that the vagina may be protected from injury through the reflected heat."

Unfortunately, however, cases occur for whom the operation just described is inapplicable, and yet for whom something may be done. For such I know no better treatment than that advised by Dr. Byrne. In describing this, he says :

"It is well known to all who have had much experience with uterine cancer that in a very large percentage of the cases met with, whether in private or hospital practice, the disease is found to have already progressed so far that palliative results or a brief respite from suffering and death is all that can be hoped for from any treatment. In such cases, as, for example, when the entire cervix has been destroyed and the corpus uteri as well as the parametric tissues are found to be involved, my course has been as follows: First, to remove all softened and broken-down tissue by the free use of a sharp curette, and having sponged the cavity repeatedly with a mixture of one part of commercial acetic acid, three parts of glycerin, and carbolic acid sufficient to represent eight per cent of the whole, I then pack the cavity with absorbent cotton and allow it to remain for a few minutes or longer as the case may be. On removing this, if all bleeding is found to have ceased, and the cavity fairly dry, cauterization may be proceeded with. If, however, oozing of blood to any extent should still continue, it will be best to pass into the cavity a properly rolled tampon saturated with the above styptic and allowed to remain for forty-eight hours before the application of the cautery.

"Cauterization in all such cases should be conducted in the following manner:

"The diseased organ should be exposed to view, and the vagina protected by a Sims's speculum and an anterior and two lateral retractors, and it may be necessary to seize the edges of the excavation by one or more volsella. Before introducing the cautery electrode a wad of absorbent cotton is to be passed into the cavity, held for a moment, and, immediately on being withdrawn, the dome-shaped instrument, brought to a cherry-red heat, is to be rapidly and repeatedly passed over the bottom of the cavity mainly. The latter is then to be again dried by wads of absorbent cotton held in dressing forceps, and cauterization resumed as in the first instance. This process is to be repeated over and over again until the deeper parts of the cavity have become dry and charred, when the sides are to be treated in precisely the same manner and roasted to the same crisp condition. The seat of operation will now present the appearance of a perfectly black and dry cavity. All ragged and overlapping edges are next to be trimmed off by the cautery knife; a firmly rolled tampon of suitable size with thread attached, and saturated with the above styptic compound, is now to be placed in the cavity, and, finally, a supporting vaginal tampon is to be applied and the patient removed to bed. The vaginal tampon may be removed on the following day, but the other should be allowed to remain for forty-eight hours or longer. The subsequent treatment will consist of vaginal douches twice daily of carbolized water."

CANCER OF THE BODY OF THE UTERUS.

This condition is rare as compared with carcinoma of the cervix.

Pathology.—In corporeal epithelioma the epithelium of the uterine glands undergoes hypertrophy, and there is formed a fungating polypoidal mass, which propagates itself over all the organ, or projects into its cavity, perhaps into the cavity of the cervix.

The cancerous mass always ulcerates and leaves wide cavities in the hardened uterine wall. The uterus becomes enlarged.

Scirrhus or encephaloid may, in rare cases, be found in the body of the womb, although the best authorities state that there is scarcely an unquestionable case of corporeal encephaloid, and that scirrhus has never been met with.

These varieties form beneath the mucosa in the substance of the uterine tissue, and extend outward, causing peritonitis and agglutination with neighboring organs and parts. When they extend inward they are certain to ulcerate.

Either form of cancer, when accompanying fibroids, does not seem to modify the latter's characteristics. One case is recorded of cauliflower excrescence of the fundus; this projected out through the cervix down into the vagina.

The microscopical appearances in no wise differ from similar neoplasms in the cervix.

Symptomatology.—The prominent symptoms of cancer of the cervix are also met with in cancer of the body, but not to the same degree nor appearing in the same order.

In cancer of the body pain occurs early, and is severe and paroxysmal, sometimes remaining at its pitch for two hours. Free menorrhagia is soon accompanied by a discharge which is profuse, watery, and fetid. In some instances there will be no discharge whatever throughout the disease. The vital forces are early greatly depreciated, and marked constitutional disturbance is a prominent early symptom of cancer of the corpus.

Physical Signs.—Inspection gives negative results. On palpation (bimanual) the body is felt to be larger and harder than normal. The cervix is usually dilated, but in a few instances has been felt to be normal. Adhesions may firmly hold the uterus in a fixed position, but in most cases it is freely movable.

The probe induces profuse hæmorrhage in nearly all cases, and by its use we learn the degree of dilatation of the cavity of the womb.

The curette is used to withdraw some of the growth for microscopical examination.

Diagnosis.—Cancer of the body and cancer of the cervix may be confounded with each other. The points that enable us to distinguish them are these: Cancer of the body is very rare; that of the cervix comparatively common; pain is very early and very severe in cancer of the body; it is rare or absent in cervical cancer. Menstruation is deranged from the very onset in cancer of the body; this is a late symptom when the cervix is attacked.

Marked constitutional disturbance and peritonitis—which is often fatal—occur early and more frequently in cases where the body is the seat of malignant growth than when the cervix is involved. There is little or no tenesmus on bimanual examination in cancer of the cervix, while this is marked in cancer of the body. The probe discovers an enlarged corpus in the latter case, while in cancer of the cervix the corpus is normal in size. The adjoining structures are implicated far more frequently, and also earlier in the disease, in cancer of the body than in cancer of the cervix.

Prognosis.—The same rules hold good here as in cancer of the cervix. The outlook for recovery is far less favorable, not only from the situation of the growth and the greater likelihood of adjacent tissues being involved, but also from the fact that, as total extirpation is the sole means of treatment, the probability of life after this operation is much less than after amputation, cautery, or scooping.

Causation.—The body of the uterus is attacked with cancer very much more frequently in nulliparæ than in multiparæ, which is in striking contrast with the prevalence of cancer of the cervix. The average age of patients suffering corporeal carcinoma is ten years greater than that of women afflicted with cancer of the cervix. In every other respect the causation is the same as in cervical cancer.

Treatment.—Extirpation is the sole means of effecting a cure in cancer of the body, and hysterectomy seems to be followed by far better results in these cases than when performed for cancer of the cervix. This may be accounted for on the ground that in the neighborhood of the cervix there is far greater liability to extension of the disease and infiltration downward and laterally.

Vaginal Hysterectomy.—While the principles of this operation are the same, the details differ with different surgeons. Some—the French surgeons chiefly—control the uterine and ovarian arteries with clamps; others use ligatures.

I shall describe the operation, and note the most important differences in the methods of carrying out the various steps of the procedure.

Preparation of the Parts for Operation.—The patient being placed in the lithotomy position, the vulva and vagina are thoroughly cleansed and disinfected and the rectum and bladder completely emptied. If the body of the uterus is alone affected, the cervical canal must be washed out, packed loosely with cotton, and closed with a pair of forceps or with sutures. If the disease involves the cervix, so that the cancerous mass protrudes into the vagina, as much as possible should be removed with the cautery or curette, and then the canal closed in the manner described. The object of this closure of the canal is to keep the wound clean and free from infection during removal of the uterus, and is very important. It is important in such cases to remove all the diseased tissue about and within the cervix before proceeding further in the operation.

Retractors should be introduced into the vagina, so as to thoroughly expose the cervix and upper part of the vagina. The cervix should then be seized with a volsellum forceps and drawn outward and upward, and the posterior vaginal wall be incised, the incision being semicircular and extending half around the cervix and outward half an inch or less, according to the size of the cervix. The peritonæum should be opened from the base of one broad ligament to the other, and the vaginal walls and peritonæum united with sutures. The anterior vaginal wall is to be next circumcised, and the uterus and bladder separated up to the peritonæum with the dry dissector or the finger. I prefer not to open into the peritoneal cavity in front until the broad ligaments are separated from the uterus up to and including the uterine arteries. The vagina may be separated from the uterus with the knife, scissors, or galvano-cautery. I prefer the cautery.

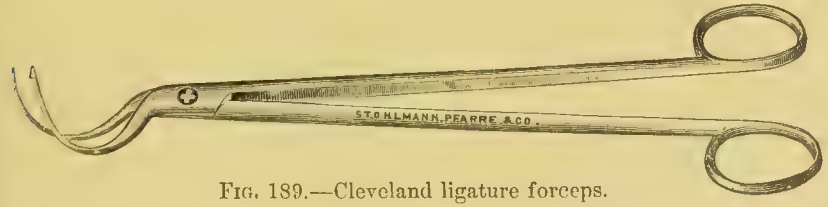


FIG. 189.—Cleveland ligature forceps.

The next step is to either ligate or clamp the broad ligaments and separate them from the uterus. If ligation is determined on, it is done as follows: A ligature is carried around the lower portion of the ligament with a curved needle, Cleveland's ligature forceps (Fig. 189), or an aneurism needle, securely tied, and then divided close up

THE CLAMP OPERATION IN VAGINAL HYSTERECTOMY.

(Modified from Landau.)

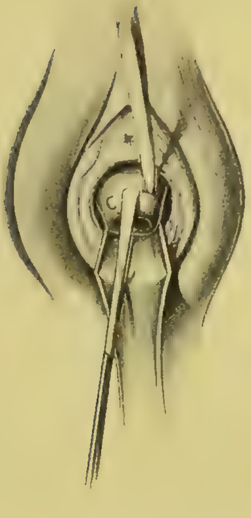


FIG. 190.—The speculum in place, the cervix is seized and drawn downward, and the incision begun at the junction of the cervix (C) and the vaginal wall.

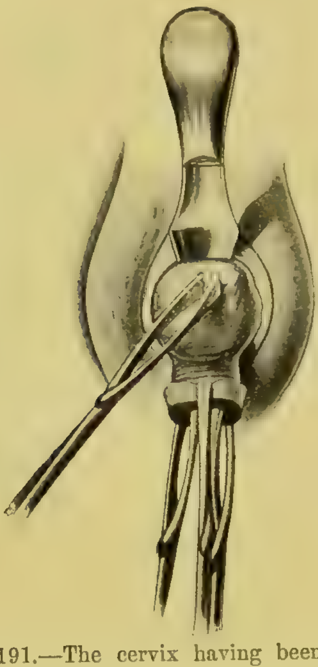


FIG. 191.—The cervix having been severed from the vaginal wall all around, the bladder stripped off, and the vesico-uterine pouch opened, the body is caught and drawn out through this anterior opening.

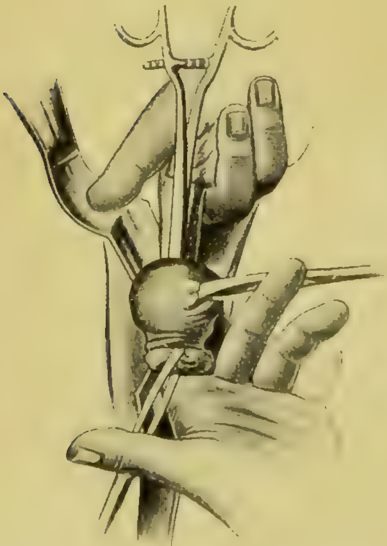


FIG. 192.—A forceps, guided by the fingers, is pushed through the pouch of Douglas.

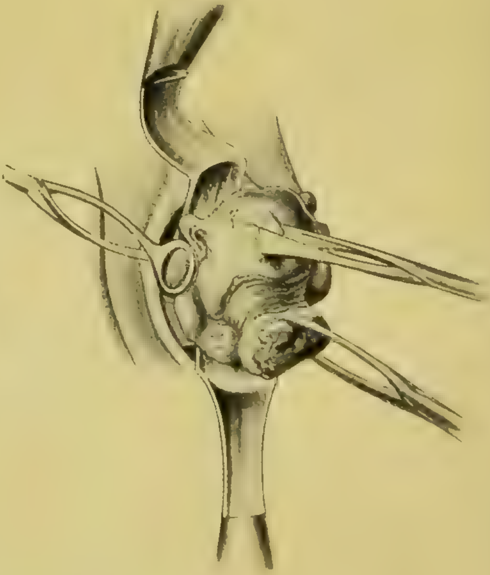


FIG. 193.—A forceps draws forward into view the tube (T). F, fundus; C, cervix.

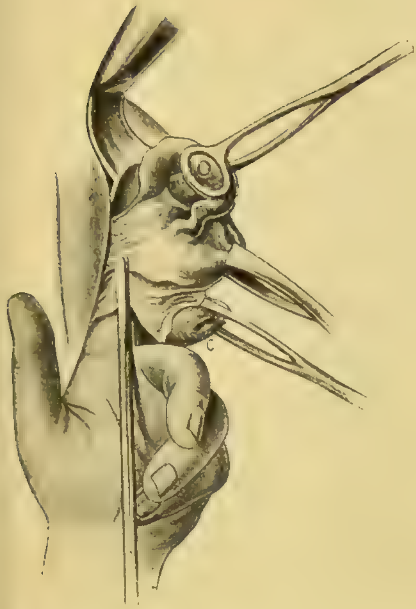


Fig. 194.—Forceps on the ovary (O) turns the broad ligament forward. The uterine artery is clamped.

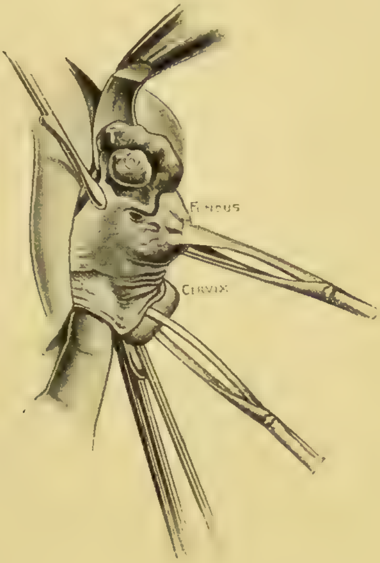


Fig. 195.—The tube and ovary being rolled forward, the ovarian artery is clamped.

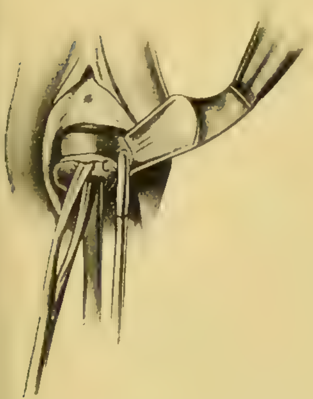


Fig. 196.—The uterine artery can be clamped as soon as the vaginal walls are freed from the cervix.

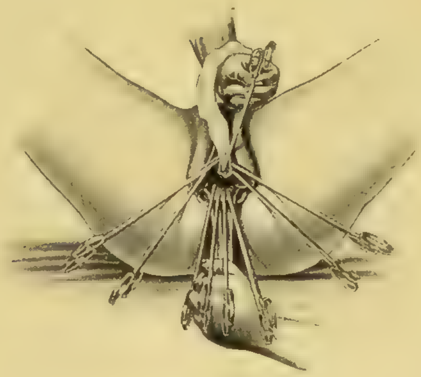


Fig. 197.—Placing the gauze (by the upper hand). The perinæum is retracted and the forceps spread apart.

to the uterus. The ends of the ligature should be cut off after it is tied to avoid traction, which would be almost sure to loosen it. Successive portions of the ligament are treated in this manner until the whole is separated from the uterus. The other broad ligament is treated in the same manner. The uterus, being now free from its attachments, is removed.

The next step is to unite the peritonæum to the anterior and posterior vaginal walls with fine catgut sutures. The peritoneal cuts should now be sponged clean. One end of each suture is then cut off and the remaining ends are tied to the opposite sutures, thus completely closing the wound, except in the center, where space enough is left to admit a small gauze drain. The vagina is to be loosely packed with gauze, and the operation is completed.

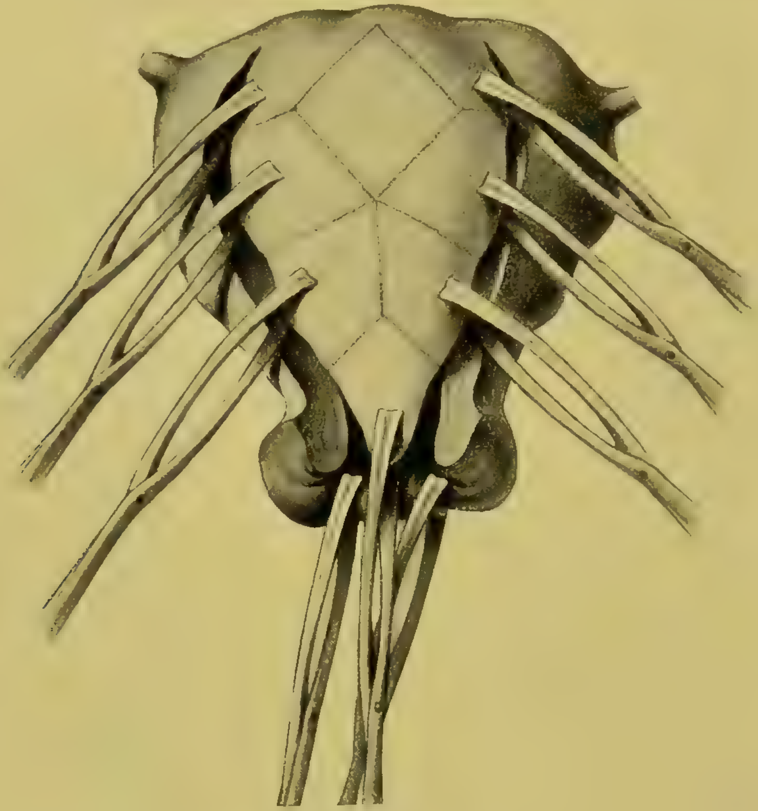


Fig. 198.—Vaginal hysterectomy by *morcellement*. The gray lines show the pieces to be removed in order, each being shown with a forceps fast to it. (Landau.)

Many surgeons prefer silk ligatures, as being more easily handled and more certain to control the vessels; but silk is objectionable for various reasons. It is likely to cause irritation and suppuration, and a longer time is required for the ligatures to come away or be removed, so that by the use of this material the recovery of the patient is delayed.

The French Method.—The peculiarity of the French method of performing vaginal hysterectomy consists in the use of pressure forceps instead of ligatures for the control of the blood-vessels. The circumcision of the vagina is performed in the manner already described, but when the peritonæum is opened the forceps are applied to the lower part of the broad ligaments. The uterus is then retroverted—although some surgeons prefer to antevert it—in order to bring the ligaments nearer to the operator, and then the upper portions of the ligaments are clamped with forceps. The ligaments are divided between the forceps and the uterus. To prevent unlocking of the forceps the handles are tied together. Gauze is then placed in the wound between the forceps to act as a drain, and either gauze or cotton wrapped around the handles of the forceps to protect the vulva. Landau's full and finely illustrated description of his clamp operation has been simplified in the series of cuts adapted from his work (Figs. 190–198).

Method with Electric Hæmostatic Forceps.—Whatever may be claimed as advantages for the ligature, even the modern ligature, that is with much care and trouble made aseptic and can be left in the tissues, has its faults and shortcomings. The catgut ligature is very difficult to sterilize and keep surgically clean, and it is liable to slip and permit hæmorrhage. In being disposed of by absorption, or being walled in or encysted, it causes more or less irritation. Dead animal tissue, though sterile, can not be taken care of in a wound without causing some disturbance.

Silk, or unspun silk, called silkworm gut, properly prepared, will not decompose, and, being less likely than catgut to slip, has some advantages, but is more objectionable still because it causes irritation, and in the effort to escape or be thrown out enters the abdominal or pelvic viscera and does great damage. There are many cases recorded of serious trouble from ligatures of this kind long after recovery from operations.

Nearly twenty years ago I learned from Dr. Thomas Keith his method of treating the pedicle, in ovariotomy, by the clamp and cautery, and I have had ample opportunities to observe that the results are vastly superior to those obtained by any other method. Within the past three years I have discovered that the same method of closing bleeding vessels is applicable in all surgical operations. At the same time I have found that it is no easy matter to use the means which give such excellent results. Naturally, this has inclined me to seek some simpler, easier way of accomplishing the same object—that is, to arrest bleeding in surgical operation. Hitherto the difficulty in using compression and heat to arrest hæmorrhage has occurred in the management of the heat element.

The process is as follows: A portion of the end of the vessel, or mass of tissue containing bleeding vessels, is seized in a forceps or clamp and firmly compressed, and while under pressure heat is applied to the instrument to desiccate or dry the parts but not to char them. In this way the walls of the arteries become united and hæmorrhage is certainly prevented. Heretofore the heat was obtained by applying a heavy cautery iron (heated in the fire) to one side of the clamp, but this rendered the procedure difficult and unsatisfactory, and limited it to the treatment of the pedicle in ovariotomy.

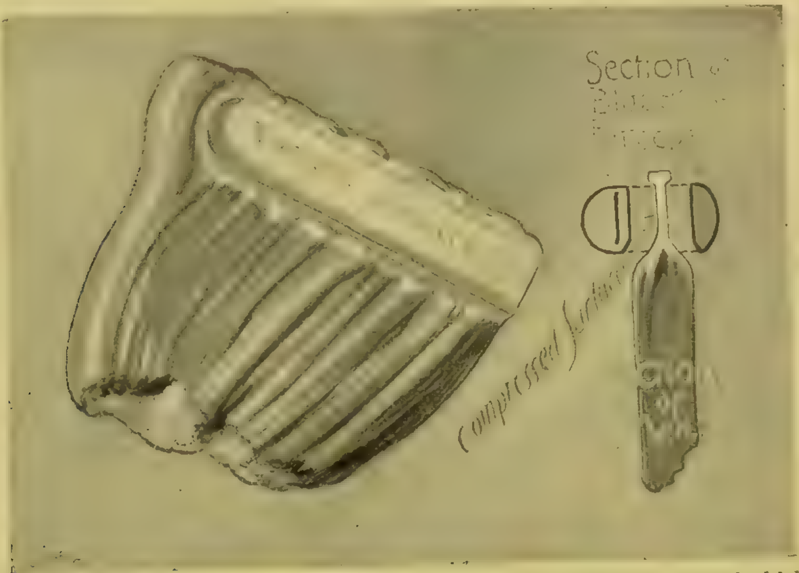


FIG. 199.—Full-size drawing of piece of fresh beef-muscle one fourth inch thick after being seized in forcep blades two minutes with current on. The compressed place is translucent as horn, not charred. The same piece is shown in section.

With the determination of improving the process and adapting it to the arrest of hæmorrhage in all surgical operations, I have employed electricity to produce the required heat and devised instruments to meet all requirements. I have now perfected the method so that I believe it to be worthy of the attention of the medical profession.

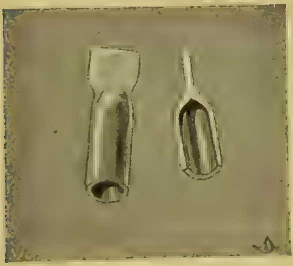


FIG. 200.—An artery from fresh beef closed solidly by author's method in one half minute. Seen in perspective and in section. Life size.

The advantages which may be fairly claimed for this way of controlling bleeding in surgery are, that it is certain and reliable in closing isolated vessels or those imbedded in masses of tissue, like an ovarian tumor pedicle, for example, or the uterine and ovarian arteries in the broad ligament. At the same time that bleeding is arrested all lymphatics are sealed up, which prevents septic absorption. Nerves that accompany the vessels are immediately and completely devitalized, and hence there are less pain and irritation in the stump. The heat employed sterilizes the parts involved, and therefore the operation is perfectly aseptic. Of these many advantages, the greatest, I believe, is that it leaves the stump of a pedicle or the end of an artery in a condition requiring the least reparatory care, so that recovery is more prompt and uneventful. My impression is that the ends of vessels and tissues of pedicles treated in this way become first hydrated and then organized (during the healing process), in the same way that an inflammatory exudate upon a serous membrane becomes vitalized. I asked Dr. Keith about this. He said that he did not know exactly what became of the stump of the pedicle treated in this way, but he did know very surely that it gave no trouble or anxiety to patients or the surgeon. In this my experience fully agrees with his. I have never known trouble of any kind to occur after an operation that could be attributed to this method of controlling hæmorrhage.

Although fully satisfied with the results obtained by compression and heat as a hæmostatic, I have long been annoyed by the practical difficulties in its employment, as already stated. While thinking of how to overcome these difficulties, my attention was called to the use of electricity in cooking and in heating laundry smoothing irons. It then occurred to me to adapt the same heating power to surgical instruments, such as the clamp and forceps.

My requirements in this regard were explained to Louis M. Pignolet, an electrician who has given much attention to electricity as used in medicine and surgery. He at once took up the study of the subject with enthusiasm and soon produced the instruments and appliances required.

The following is Mr. Pignolet's description, with illustrations of the instruments in question:

"The construction of the hæmostatic forceps is plainly shown by the illustration, of which Fig. 201 is a side view, Fig. 202 a section of the jaw on an enlarged scale, and Fig. 203 a top view of the chamber in the jaw, also on an enlarged scale, showing the arrangement of the heating wire. The chamber is formed by attaching a flat case (A) of sheet metal to the inner side of one of the jaws (B) of an ordinary compression forceps, in such a manner as to form a water-tight chamber. This increases the size of the jaw but little, as the case is less than an eighth of an inch deep and has the same length and width as the jaw, so that the instrument appears like an ordinary compression forceps.

"The wire (C) for heating the sheet-metal face of the jaw is of platinum or other suitable metal, and zigzags back and forth from side to side in passing through the chamber. A fireproof material, which is also an electrical insulator, separates and insulates the wire from the sides of the chamber. The space between the wire and the back of the chamber is several times greater than that between the wire and the front, so that the heat from the wire can pass much more easily to the front than to the back. One end of the wire is electrically connected to the instrument, and the other to a copper wire (E) passing out of the chamber through an insulating bushing (F) in the back of the jaw. The copper wire extends back to the handle of the instrument, and is insulated by a waterproof covering. Terminals are provided at the end of the copper wire and the handle of the forceps for making connections with the flexible wires or cables which convey the electric current to the instrument. The path of the current is through the copper wire, the wire in the chamber, and one blade of the forceps. The copper wire and the blade present but little resistance to the electricity and are but slightly (if appreciably) heated by the passage of the current. On the other hand, the wire in the chamber offers considerable resistance to the current and is heated by it

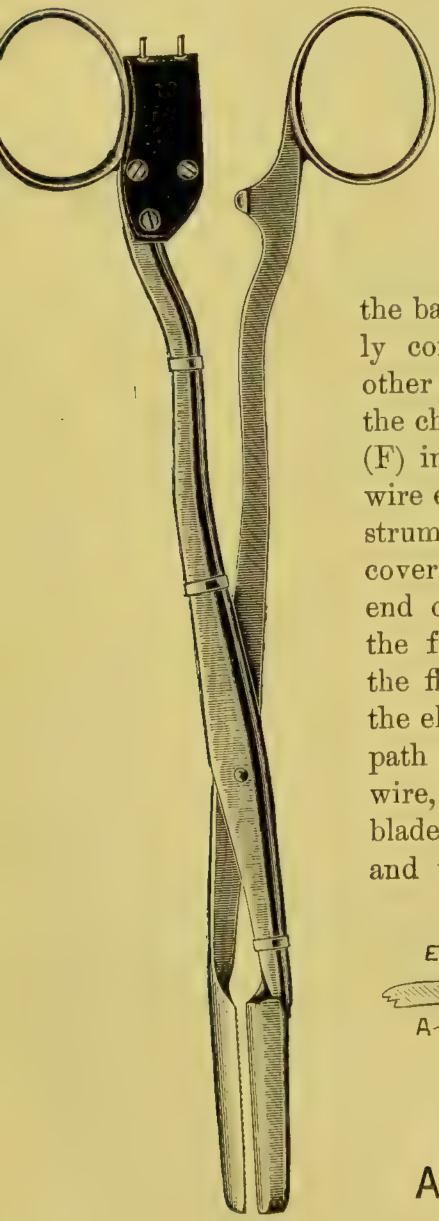


FIG. 201.

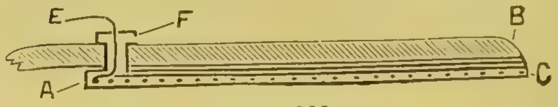


FIG. 202.

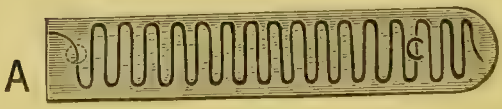


FIG. 203.

to a greater or less degree, according to the strength of the current and the resistance of the wire.

"By this method of construction the heat is concentrated upon the inner surface of the jaw of the forceps or clamp—the mechanism of which remains precisely the same—and but little is expended uselessly in heating the other parts of the instrument. The electrical energy necessary for heating the jaw is therefore reduced to the smallest possible quantity, and varies from ten to thirty watts, according to the size of the forceps.

"The required degree of heat, which varies from 170° to 190° F., is attained very quickly, owing to the closeness of the heating wire to the face of the jaw and the thinness of the sheet metal composing the face. Furthermore, the instrument can be sterilized in the same manner as the ordinary forceps without damage.

"On this principle, forceps of various shapes, from the largest to the smallest sizes, are heated, as the general formation of the instruments is not modified by the heating attachments.

"The method of construction described is advantageous, for it simplifies the instrument by dispensing with the extra copper wire that would be required if one end of the heating wire were not connected to the forceps; but if desired, the heating wire may be connected to a second insulated copper wire so that no current would flow through the blades of the forceps.

"The heat developed in the forceps depends upon the strength of the electric current and the resistance of the heating wire. The current required to properly heat each forceps may be ascertained by trial and marked upon the instrument; or all the forceps (both large and small) may be so constructed as to be heated to the required degree by a current of a predetermined strength, by suitably proportioning the resistance of the heating wire. A small ampère meter included in the electric circuit measures the current received by the forceps, and enables the current to be regulated to suit by means of a rheostat or other controlling device. The heat of the jaw is thus controlled with certainty, as the current required by each forceps is known, as explained above.

"The length of time during which the forceps should be heated varies from thirty seconds to two minutes and a half, depending upon the thickness of the tissues compressed between the jaws of the instrument. It is advantageous to give the forceps a slight excess of current for a few seconds at the commencement, as this hastens the desiccation of the tissues and shortens the time of application. If, for example, ten ampères be the current required to heat the forceps to the proper degree, start with twelve ampères and decrease to ten ampères after the lapse of a quarter or a third of the time during which the current is to be applied.

"As the forceps require less electrical energy than the average cautery electrode, the current from a small storage battery or a suitable primary battery, such as the excellent battery of Dr. Byrne, can be used for heating them, but the current from electric-light mains is preferable, as it is not subject to failure, and the care and attention necessary to keep a battery in working order are avoided.

"Alternating current of the pressure used for lighting buildings can be converted into a current of lower pressure adapted for the forceps, as well as cautery knives and examining lamps, by means of a small transformer capable of giving current of different strengths and pressures. The current is generated in a coil of wire called the 'secondary' by the inductive action of the lighting current passing through an adjacent coil called the 'primary.' The two coils are carefully insulated from each other, so that there is no danger from the comparatively high-pressure lighting current, as it can not pass from the primary to the secondary. A further advantage of the transformer is that it increases the quantity of current available as well as reduces the pressure, so that a current of large quantity but low pressure can be obtained without overloading the smallest electric-light wire used.

"The pressure is varied to suit the forceps or other device by cutting a sufficient number of the turns of secondary wire in or out of the circuit by a switch, or by altering the strength of the inductive action upon the secondary coil by moving it to a place where the action is stronger or weaker, as a greater or less pressure is desired.

"A convenient form of transformer, constructed according to the latter method, is illustrated by Fig. 204. The flexible cable conveying the electric-light current is connected to the binding posts, A, the cautery electrode to B, and the incandescent lamp to C. The current is regulated by sliding the knobs (D and E) which control the cautery and lamp coils respectively toward the center of the instrument to increase the pressure and quantity, and *vice versa*. If the electric-light current be continuous, it can be converted into an alternating current suitable for operating a transformer by a small rotary converter.

"The current from the electric mains can be used directly, without the intervention of a transformer, if it be controlled by a rheostat; but this is not advisable, for the high pressure of the current might cause a dangerous arc or a shock under certain conditions arising from some disarrangement of the apparatus.

"A portable generator of electricity which would be as reliable as the ordinary dynamo is an important requirement for medical and surgical purposes where an electric-light current is not available. This necessity led to the construction of a small hand-driven dynamo for use in such cases.

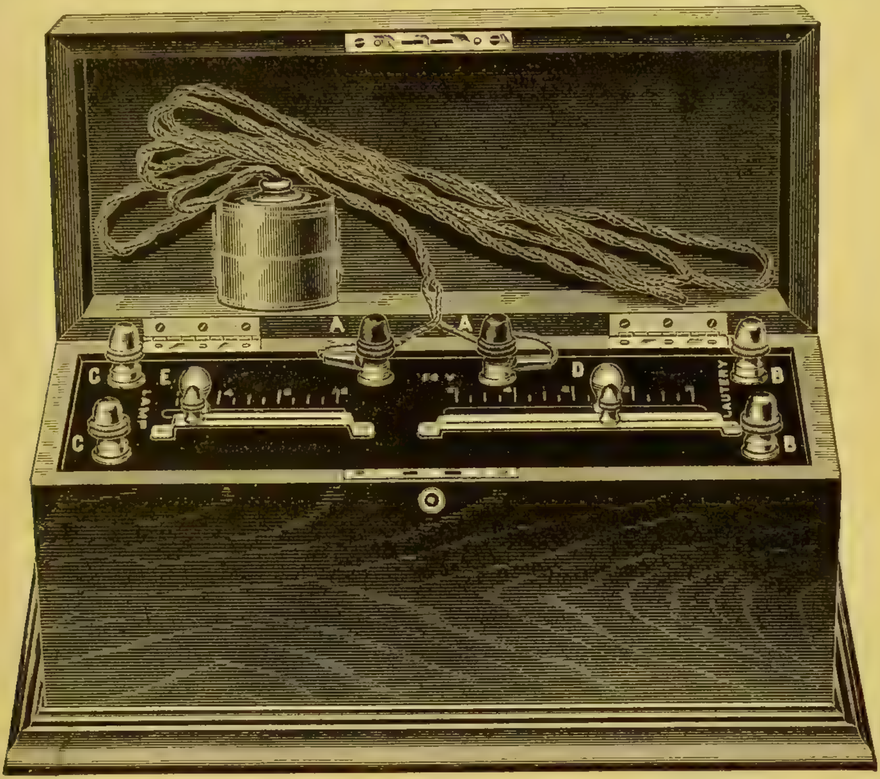


FIG. 204.—Transformer for heating hæmostatic forceps and lighting small lamps.

"The machine is represented by Fig. 205, and is a convenient and reliable means for heating the hæmostatic forceps as well as cautery electrodes, and for lighting small incandescent lamps. It requires no attention, except an occasional oiling, and is less liable to derangement than an ordinary electric-light dynamo. The dynamo, which has a very high efficiency for a small machine, was specially designed for the purpose, and is driven by sprocket wheels and chains, as shown by the illustration. The armature is provided with two separate windings, each with its individual commutator and brushes for collecting the current. Each winding is capable of generating a current of fifteen ampères at a pressure of from one and a half to three volts, according to the speed of the armature. A switch is provided for connecting the windings together in parallel, to double the quantity of the current, or in series, to double the pressure. In this way a current may be obtained of large quantity and low pressure, such as is required for cautery electrodes, as well as the current of smaller quantity and higher pressure needed for small lamps and other apparatus. The machine will furnish current of any pressure from one and a half to six volts, and even slightly beyond these limits, which is sufficient for all ordinary uses.

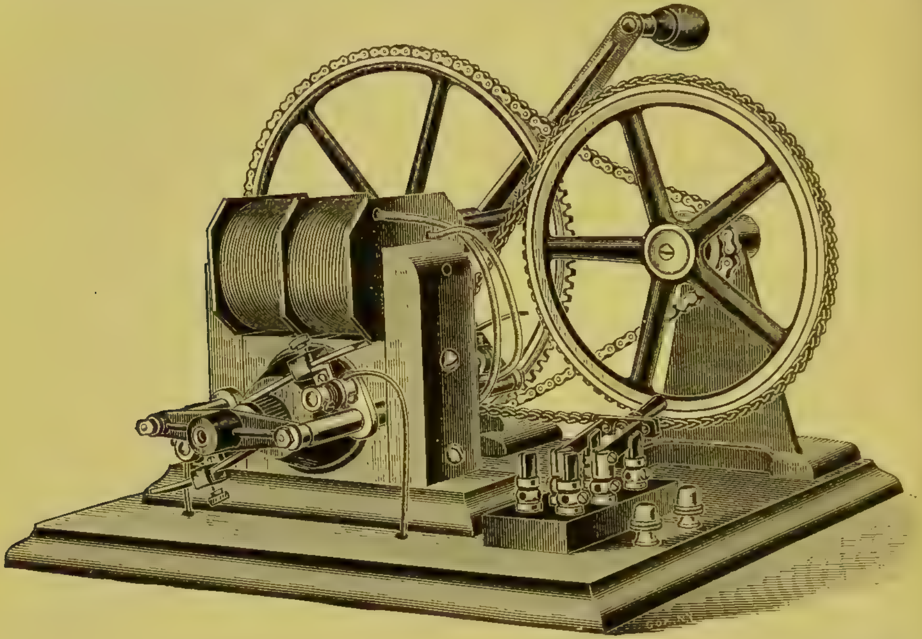


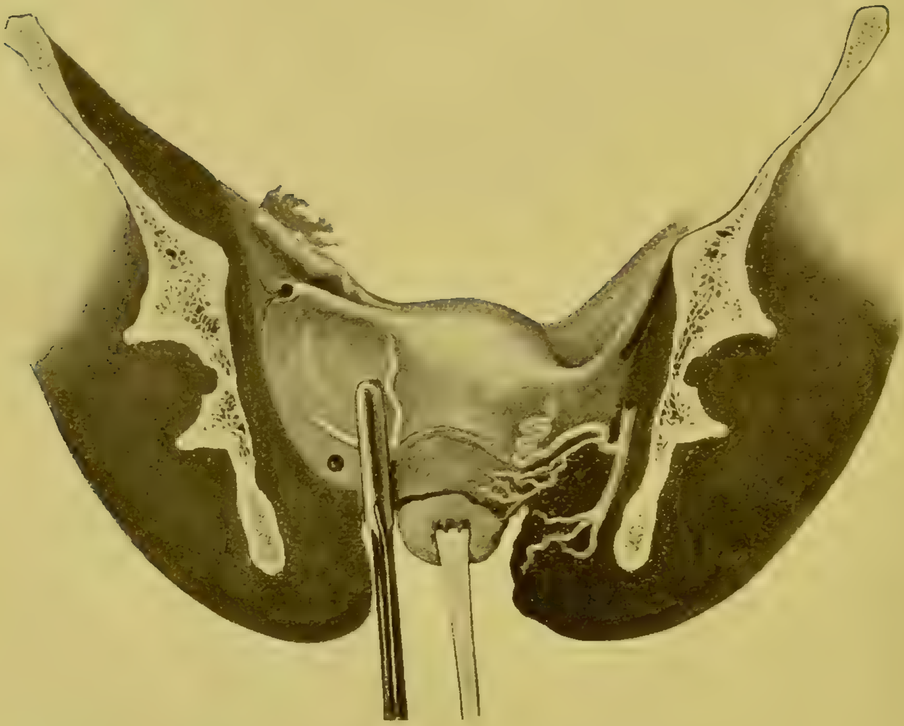
FIG. 205.—Hand-driven dynamo for heating hæmostatic forceps and cautery electrodes.

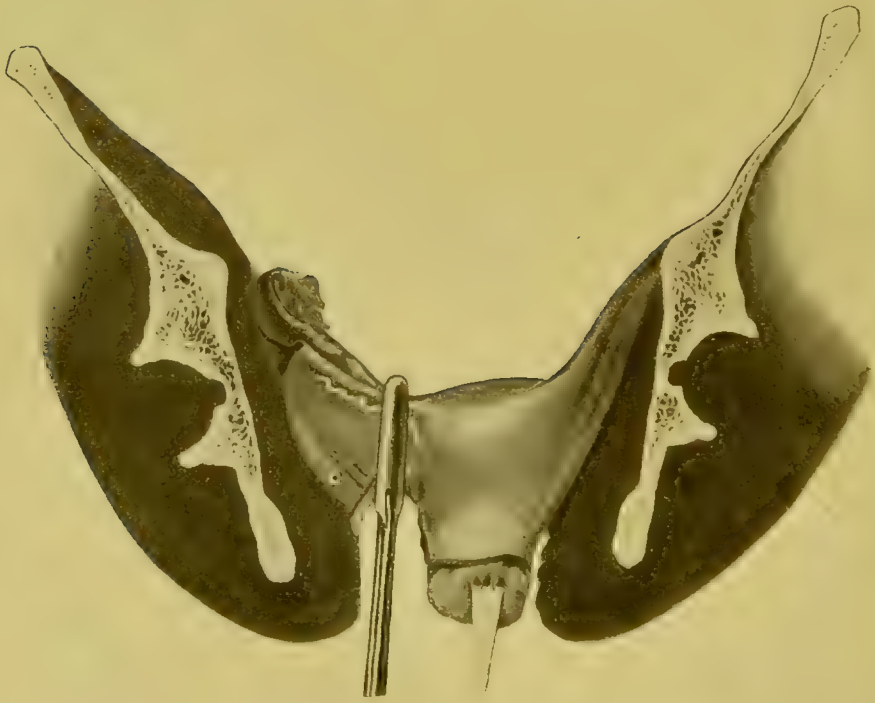
"A small voltmeter, or an inexpensive galvanometer, connected to the circuit enables one to keep the current at any desired strength."

Vaginal hysterectomy offers superior opportunities for the use of the hæmostatic forceps in arresting hæmorrhage. I have tried every known method of doing this operation and found them all objectionable, and so I was led to do the operation as follows:

The vagina is divided all round the cervix uteri with the cautery knife. The bladder is separated from the uterus and the peritonæum opened in front and behind in the usual way. The lower portion of the broad ligament is then seized with the compression forceps as close to the uterus as possible and the heat turned on. The compression is increased while the heat is being applied. A little practice is needed in order to know the degree of heat that is

PLATE II.





being used and the length of time that it should be continued. When one is doubtful about this, the forceps may be removed and the parts inspected, and, if need be, the forceps should be reapplied and the heat continued long enough to obtain the desired effect. The ligament is divided with knife or scissors between the forceps and the uterus as far up as the vessels have been closed. The lower portion of the ligament on the other side is treated in the same way. The uterus is drawn down, and the remaining portions of the ligaments are treated in sections until the uterus is completely made free. The operation may be briefly described by saying that it is performed in the same way as when forceps is used to control the bleeding, with the difference that instead of leaving the forceps on long enough for the compression alone to arrest the hæmorrhage, the heat completes the hæmostasis and the forceps is removed at once.

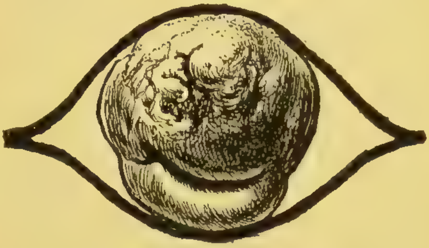


FIG. 206.—Cautery incisions about the cervix.

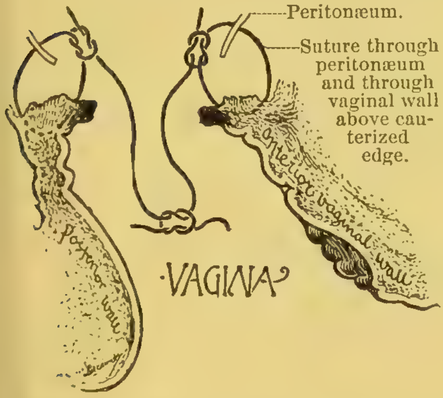

Peritonæum.
Suture through peritonæum and through vaginal wall above cauterized edge.
VAGINA

FIG. 207.—Diagram of vagina and wound after removal of uterus. The suture passes through the peritonæum and the vaginal wall beyond the cautery cut, and is tied; then is tied to its fellow on the opposite wall.

In controlling hæmorrhage from small arteries my observations have been limited to such operations as amputation of the mammary gland and small vessels in divided adhesions in abdominal operations. The forceps employed for this purpose is in form the same as the ordinary artery forceps, and is used in the same way. The artery is seized and held firmly, and the electrical connection made and continued until the end of the compressed vessel is desiccated. This takes very little more time than applying a ligature; in fact, it takes less time when the vessel is in a deep cavity and not easy to get at. In the management of small bleeding vessels in the abdomen or down in the pelvic cavity this electrically heated forceps is very useful and convenient, and saves much time, trouble, and anxiety.

Up to the present time I have not practiced this method of controlling the hæmorrhage in doing abdominal hysterectomy, but I am confident that it can be employed satisfactorily in that operation.

After-treatment.—The after-treatment will depend upon what method of operating has been selected. In all cases rest and, if necessary, a cathartic are to be prescribed. If pain is marked and the stomach irritable, opium and warm water may be given by the rectum. For the first few days the food should be fluid; on the third day the bowels should be moved by a saline cathartic, and by an enema of glycerin and water. The gauze packing is left in the vagina for five or six days by most operators. If the operation has been done with ligatures, I prefer to change the gauze at the end of forty-eight hours. When forceps are used I remove the gauze at the end of thirty-six or forty-eight hours, and introduce a gauze drain, which is to be changed at the end of two or three days, and replaced if there is much suppuration. If the wound unites without much suppuration, a douche can be used, but without the least force, for five or six days, and continued daily until all the discharges have ceased.

After-treatment of cases operated upon by my method: The vagina is loosely packed with gauze, which is removed at the end of forty-eight hours, and if there is any discharge it is not replaced. After the fourth or fifth day the vaginal douche of borax and water may be used, and repeated daily if there is any discharge. At the end of a week the wound is, as a rule, completely healed, and no further local treatment is necessary.

SARCOMA OF THE UTERUS.

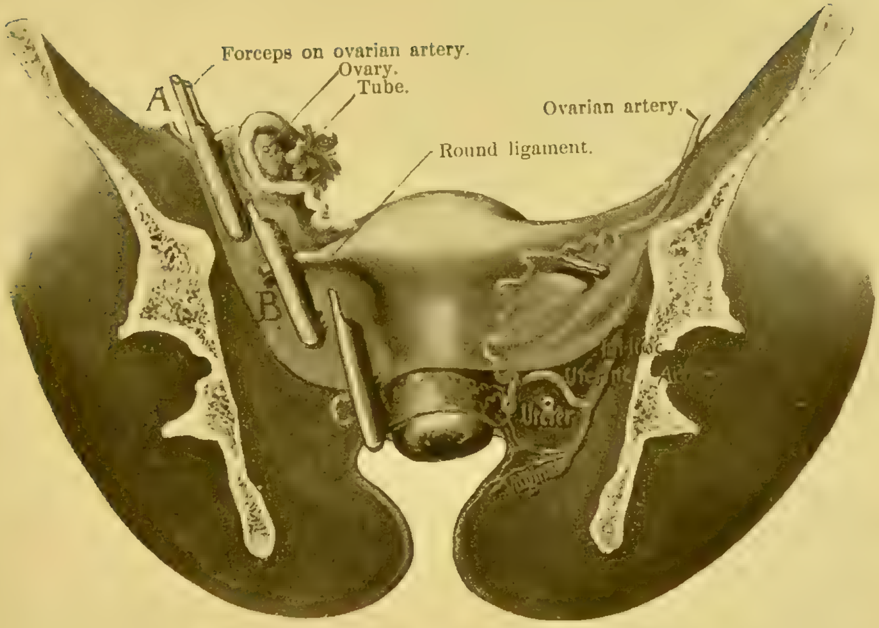
Fibroplastic tumors, or "recurrent fibroids," are neoplasms of the embryonic tissue type whose seat is usually in the body of the uterus.

Pathology.—The connective tissue is the origin of uterine sarcoma; and immediately beneath the epithelium this tissue forms nodules or ridges which bulge out the softened and somewhat disintegrated mucosa into the uterine cavity.

Since the projections are often polypoidal, pedunculated, soft, and medullary in consistence, rapid in their growth, and vascular, it is easy to see how they can be mistaken for carcinoma. Indeed, Klebs has found a profuse epithelial growth upon sarcomatous nodules of the uterus and then the growths seem to have joined.

The uterus may be greatly distended by the fungus-like growth. When the mucous membrane is wholly disintegrated, the uterus

PLATE III.


Forceps on ovarian artery.
Ovary.
Tube.
Ovarian artery.
Round ligament.
A
B
Int. Iliac
Uterine Art.
Ureter

may be perforated, and in rare instances the sarcoma may proliferate out through the abdomen.

In other cases the growth is deeper, less diffuse, and more nodular. It begins anywhere in the uterine tissue between the submucous layer and the peritoneal investment and forms a hard, roundish mass like a fibroid. This may assume a fungoid or polypoid form and hang down in the uterine cavity; as in cancer, so here, the soft may be a later stage of the hard sarcoma.

Possibly a degenerating fibroid of the uterus may be associated with a sarcoma; or, as it then would be called, a fibro-sarcoma.

As to the effects, the vagina, peritonæum, Fallopian tubes, and ovaries may be invaded by sarcomatous masses.

The uterus is often inverted, either from an easily dilated cervix or from weakening or palsy of the uterine muscle.

Symptomatology.—The classical symptoms of malignant disease—pain, hæmorrhage, and discharge—are met in cases of sarcoma uteri.

Pain, however, occurs late, if at all, and seems to have often been confounded with uterine tenesmus, which is a common symptom. At times there may be severe pain from pressure on the rectum and bladder.

Menorrhagia is an early symptom; or if the disease is in those who have passed the menopause, menstruation seems to have returned. Later, there is a discharge resembling the rice-water stools of cholera which is only faintly suggestive of the cancerous odor. But as the neoplasm ulcerates, the discharge is as fetid as that of carcinoma, and in it are pale-gray shreds, which upon microscopical examination at once reveal the true nature of the growth.

A cachexia is very slowly and gradually developed, yet finally it is as marked as in cancer.

Physical Signs.—Palpation reveals a soft, friable, pedunculated tumor which may be felt to spring from the body of the uterus. The os, through which this tumor is forced, is dilated, softened, and irregular. The finger or the sponge-tent may be used to dilate the cervical canal when the mass has not yet made its way down to the os internum.

Bimanual palpation shows the uterus to be large, sometimes reaching halfway to the umbilicus, and oftentimes as irregular as when the seat of fibromata.

The sound shows the extent of the enlargements; its use causes intense menorrhagia.

The curette is useful to obtain scrapings for microscopic examination.

Diagnosis.—Sarcoma may be mistaken for carcinoma; but in the latter disease pain is a far more frequent, early, and severe symptom; the discharge is fetid almost from the very onset; the cervix is most difficult to dilate with a sponge-tent; the constitutional symptoms are more severe; and the duration of the disease is rarely over a year. These symptoms are in contrast with what occurs in sarcoma.

Finally, a microscopic examination of some of the scrapings will always be necessary before determining the diagnosis.

Prognosis.—Although a patient with sarcoma of the uterus lives on the average three or four years after the tumor is fairly developed, yet the outlook for ultimate recovery is most grave, all cases slowly but surely tending toward a fatal issue.

Sarcoma tends to reappear after most careful removal, although the time elapsing between removal and recurrence is much longer than in the case of carcinoma.

The prognosis will greatly depend upon an examination of the scrapings: when these show scanty stroma with an abundance of cell elements, the course will probably be as rapid as that of encephaloid cancer; but when the cells are few and the fibrous tissue is abundant, life may be prolonged for six or eight years.

Among the complications are septicæmia, anæmia, peritonitis, and sarcomatous nodules in adjacent organs.

Causation.—Age is the chief predisposing cause; half of all the cases occur between the ages of forty and fifty, and before thirty or after sixty sarcoma is extremely rare.

In cancer I referred to the occurrence of the disease in those who had borne many children; but sarcoma seems to develop in sterile wombs in nearly fifty per cent of the recorded cases.

It is a mooted question whether traumatism and uterine inflammation have any influence in the causation of sarcomata.

Treatment.—When pedunculated tumors project into or out through the cervix, the sharp spoon or the galvano-cautery, or even the finger-nail, may be used to remove them. Then carbolic or nitric acid may be applied to the base of the tumor.

When the growth is not sessile but apparently superficial, thorough curetting and the application of nitric or carbolic acid are advocated.

Deep sarcomata can only be treated by extirpation of the uterus.

CHAPTER XXIII.

THE MENOPAUSE.

The menopause marks the dividing line between middle life and the beginning of old age.

The permanent suspension of the menstrual function is known by several names, such as critical time, climacteric or climacteria, turn of life, and menopause, the latter term being the most expressive and preferable.

The natural history of the final cessation of menstruation varies so much in different individuals that it is difficult to accurately give a typical account of it. The time when it occurs ranges from forty to fifty years of age, the average in this country being about forty-five. The menopause coming early or late depends apparently upon the delicacy or health and vigor of individuals. There is a popular idea that those who begin early should stop early, but, according to my observations, those who reach the period of puberty betimes because of good health and strength, and who continue healthy, are likely to maintain the menstrual function later in life, providing that all the sexual functions are normally exercised throughout middle life.

The question has been raised as to whether celibates do not reach the menopause earlier than fruitful women, but I have not yet obtained facts sufficient to answer this definitely. In women of good health, to whom the change comes without complications, I have observed that in one class the menstrual flow becomes less free and shorter in duration, then a period may be missed, to be followed by a recurrence or two, and then it finally ends. In others the intermenstrual period is lengthened to five or six weeks, and the flow when it does come is free, often profuse, and lasts longer than usual. The time from the waning until the final cessation of menstruation varies from six months to two years or longer.

The menopause being an event which is natural to woman, there is nothing in its occurrence which should cause ill health; still it is attended by certain phenomena indicating special modifications of the organization which disturb the comfort and general activity of the most healthy women, though not to a degree that can be called ill health. Many increase in flesh, become less inclined to mental and physical activity, and show signs of excrementitious plethora. There is usually constipation, often due to deranged secretions, and the nervous and vascular systems are more or less disturbed. Very often functional heart trouble, irregular action and palpitation of the heart, with a feeling of impending danger, are the common symptoms. These are frequently associated with intercostal neuralgia of the left side. Grave apprehensions on the part of the patient are excited by these symptoms.

Similar indications appear in amenorrhœa in young subjects. This points to the fact that cessation of the menses has a peculiar influence upon the innervation of the circulatory system. The flushings of the face, "hot flashes," from vaso-motor derangement, annoy them sometimes very much. Fullness of the head and occasionally headache and drowsiness during the day, and disturbed sleep at night, are frequently noticed. In other cases the appetite fails slightly, and there is no gain in weight, perhaps a slight loss of flesh. The same disturbed circulation is generally present, but there is, on the other hand, increased nerve excitability. Complaint is made of restlessness, and a number of minor symptoms, such as impaired memory from lack of interest and concentration, are observed and often dreaded. These are the usual symptoms which attend the menopause in healthy women living under favorable circumstances.

Comparing the menopause with puberty shows that they are almost exact opposites, the one being a development of structure and establishment of function, the other a decay of structure and suspension of function. One marked difference is noticeable: menstruation is complete and perfect from the beginning. Established after all the structural conditions are matured, it is maintained in full effect. The menopause comes gradually as the decline of the structures progresses.

Atrophy of the sexual organs from impaired nutrition is the anatomical change that directly leads up to the menopause. The ovaries, having all along been breaking down to a certain extent, at each ovulation arrive at a condition of senile atrophy, and no longer exert their full influence in the economy. There is not now the demand for so large a blood supply, and the uterus shares in the lowered nutrition. The ovaries first arrive at the stage of atrophy through a gradual breaking down of the tissues, which causes incompetence. This, no doubt, is the most important factor in the causation of the menopause, but it is only one of several. There is, furthermore, an atrophy or lowered nutrition of the spinal centers and organic nerves which govern the sexual organs at this time of life, and the brain also to some extent withdraws its influence from them. Simultaneously with these changes the uterus becomes atrophied, the degeneration progressing slowly. There is at first anæmia of the uterus, which is apparent in the pallor of the vaginal and cervical mucous membranes. The whole organ gradually diminishes, until finally it approximates to the infantile in form and size, although the senile uterus is a little larger than that of a child. When these anatomical changes are completed menstruation ends, but the atrophic diminution continues for some time after the menopause.

Leith Napier, in his elaborate work on the Menopause, gives as the cause the general atrophic condition which comes on in senility. I have always taught that it was the result of the atrophic changes in the sexual system and in the nerve centers which preside over it. I do not believe, as Napier claims, that it is due to the general atrophic condition of the entire organization.

As already stated, the menopause occurs in consequence of a decline or atrophy of the sexual organs, nutritive supply, and innervation; hence there should be a harmonious falling off in all the structures concerned in the functions of the sexual organs. When that is the case the change of life is free from anything that requires the attention of the physician; but when the nutritive changes which precede the suspension of the menstrual function progress faster in one portion of the economy than in another, morbid disturbances arise. It follows that certain affections which occur at the menopause are due to deranged nutrition and premature deterioration of that portion of the cerebro-spinal sympathetic systems which govern the sexual organs. Others are due to premature or delayed atrophic or destructive changes in the sexual organs themselves.

Varying forms of derangements may arise from these causes. For example: Withdrawal of the mental influence may cause suppression of the menses before the sexual organs are atrophied, and an over-devotion to matters sexual may cause menstruation to continue in an imperfect way after the wasting of the uterus and ovaries takes place to some extent. On the other hand, degeneration of the ovaries and uterus may cause suppression of the menses while the cerebro-spinal structures may still be perfect and functionally active. Certain diseases of the sexual organs may keep up a modified form of menstruation after the nutrition of the nervous system has begun to decline. When this latter condition prevails, the nervous and nutritive systems have a drain imposed upon them which they are incapable of sustaining, and consequently suffer derangement. On the contrary, while the nutritive and nervous systems remain healthy and active there is a necessity for menstruation, and if (owing to atrophy or malnutrition of the sexual organs) menstruation is suspended the general economy is sure to be deranged.

The derangements and disorders incident to the menopause may be classified, according to the way in which they are manifested, under three heads: premature or delayed menopause, and constitutional derangements accompanying or following the menopause. The latter is subdivided into nutritive and nervous disorders consequent upon the suspension or undue continuance of this function.

Premature Menopause.—The function of menstruation may be suddenly suspended, or it may gradually subside and end completely at too early an age. The abrupt ending of menstruation being the most unnatural, gives rise to the greater disturbance of the general health. The causes of premature menopause are of two classes: diseases and injuries of the sexual organs, and diseases of the nutritive and nervous systems. By recalling the conditions necessary to normal menstruation, given in the chapter on Menstruation, it will be seen how these causes are operative. The disorders of the sexual organs which cause a premature menopause are degenerative disease of both ovaries, double ovariotomy, and loss of the uterus or injuries to it, which lead to its premature atrophy. Of the latter, the most conspicuous are hysterectomy, the ovaries being left; puerperal metritis, which results in superinvolution; and extensive lacerations followed by the formation of much scar tissue. Operations for the relief of deep bilateral lacerations, requiring removal of large portions of uterine tissue, may lead to atrophy. This has been noticed by several observers in late years.

Removal of the ovaries may be taken as the principal cause of abrupt menopause. Ovaries that are slowly destroyed by disease bring about the menopause more gradually. This is made quite apparent from the clinical facts, that those who have well-defined destructive diseases of the ovaries menstruate imperfectly for some time, and suffer very little from the menopause when it is completed by the removal of the ovaries and tubes, because the change comes more like the natural way. Premature menopause caused abruptly by removal of functionally competent ovaries and tubes, removal of the uterus, or diseases and injuries of the uterus, which incapacitate that organ for performing its functions, give rise to such marked derangement of the general health as to demand special consideration. Fortunately, the ovaries are not sacrificed so often now as in the near past, when they were removed in the vain hope of relieving certain neuroses, incurable dysmenorrhœa, and uterine fibromata. It is strange that Napier makes no allusion to induced menopause.

Symptoms.—The effect of the removal of the normal ovaries in middle life is to derange the nervous, nutritive, and circulatory systems. The clinical history appears in many cases to partake of the characteristics of neurasthenia, nervous irritability, and derangement of the emotions. Great muscular and nerve weakness, indicated by continual weariness, soon appears. In some there is decided nervous irritability (that which is known as nervousness), with a disposition to try to do much, but who become easily fatigued. There is mental depression, indicated by sighing and lamenting over real pains and debility, and imaginary evils that are present or impending. Much of this depression and emotional disturbanced comes from a consciousness of being sexually impotent. The nervous systemic disturbance is manifested by headache, pain in the neck and back, pain in the limbs, tenderness of the skin, strange wandering pains, and queer feelings in the head and elsewhere. These symptoms are the same in kind as those found in connection with the menopause at the right age for it; but in cases of premature arrest of menstruation the disturbances, mental and physical, are greatly exaggerated.

Dr. Savage * calls attention to some of the mental troubles complained of by such patients. They fancy, he says, that something has burst in the head or womb; have a sensation as if hot blood were over the brain, and a feeling of deadness or emptiness. With the passing away of the sexual functions, querulousness, jealousy, and a fancy that their husbands no longer care for them, not infrequently occur. All of these symptoms I have frequently observed in my own practice. There are also pelvic tenesmus and pain in the ovarian regions, presumably in the stumps left after the removal of the ovaries.

The next symptoms in the history are derangement of the circulation, chiefly vaso-motor, due to deranged innervation; irregular heart action; flashes of heat, and cold hands and feet; cold perspiration followed by hot, dry, feverish skin; numbness of the extremities, most frequently of the left arm; creeping, crawling feelings in the skin, and burning spots here and there. Nutrition is generally impaired, and nervous indigestion is present in all cases as a rule. Assimilation is defective, as the loss of flesh and softened state of the muscles indicate. The skin shows malnutrition in being either dry and hot or cold and clammy. These indications are all more marked at the time when the patient should menstruate. These periodical exacerbations are most distinct at the first. As time goes on the patients adapt themselves to the new order of things gradually. If properly managed, recovery may take place in time, but if left without care they become chronic invalids or insane. Artificial menopause is more often followed by insanity than the normal climacteric.

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* Medical Press, November 8, 1893.

The effect upon sexual instincts of removal of the ovaries in adolescence has been discussed long and laboriously in the past years, but nothing new has been advanced. Repetition of the two opposite, old, and rather ridiculous ideas—one, that the removal of the ovaries unsexes women, and the other, that it does not affect them at all in this respect—is about all that has been heard on this subject during the last eighteen or twenty years. The fact is, that it does not unsex women, but in time impairs sexual characteristics, and they are, as a rule, finally lost. The passing away of the sexual appetence and the consciousness of being positively sterile often have a most disastrous effect upon the mind, and frequently lead to insanity. I will refer to this again in treating of insanity among women.

Treatment.—The first indication is to quiet the mental disturbance. Much can be done to relieve the patient's depression by giving hope of recovery. Sedatives are required to give sleep, and nerve tonics, such as are suitable in melancholia, are called for; camphor, lupulin, and in some cases small doses of opium, give relief. The opium should be given with care, and without the patient knowing what she is taking. Lately I have used codeine with better effect than opium gives. The deranged circulation is best managed with a combination of digitalis, strychnine, and belladonna. Occasional attacks of palpitation of the heart—pain in the cardiac region with difficult respiration—are relieved with nitroglycerin, strophanthus, and digitalis. Indigestion is generally of the nervous type, and is controlled by gastric sedatives such as bismuth and oxalate of cerium, or subgallate of bismuth. The spinal symptoms are, I presume, due to a hyperæmic or anabolic state, hence the irritability, nervous twitchings, and neuralgic pains. When these are annoying, relief is obtained by dry cupping, alternating with hot and cold douches, or sprayings, hot and cold, applied in rapid succession to the lumbar regions. Time is the great factor in restoring the equilibrium, and the main object is to relieve and sustain the patient until the new order of things is established.

Enforced Menopause from disease, injury, or removal of the *uterus*, while the ovaries are left, causes a general derangement which may be termed an exaggerated menstrual *molimen.* The nutritive preparations for menstruation go on, and when the eliminative function is not performed there is a temporary plethora. The patient complains of fullness of the head, flushed face, very often headache, and oppression which is felt as weakness and indisposition to engage in mental or physical exercise. The nervous systemic disturbance is manifested by drowsiness, low-spiritedness, and inability to think clearly and quickly. Those of a nervous temperament are irritable, fretful, and, although sleepy at times during the day, often have sleepless nights.

Treatment.—The old practitioners employed bloodletting, and with decided benefit. In strong women it might be practiced with advantage at the present time, but it should not be continued at each recurring menstrual period, as the habit of requiring bleeding is easily established. Depletion by other means, like saline cathartics, for example, gives much relief, and mercurials are of great value when the liver and kidneys are inactive. Small repeated doses of mild chloride of mercury, followed by a saline, or natural cathartic waters, act well, and Turkish baths and muscular exercise aid in some cases. The headache often complained of as a painful fullness is best relieved by bromide of soda with antipyrine or monobromide of camphor. Piperazine is the best solvent, and gives great relief in the uric-acid saturation which is often present and causes neuralgic, rheumatic, and gouty symptoms. The diet should consist of milk, eggs, vegetables, and fruit, with very little animal food. The quantity of food should be limited ; underfeeding rather than full diet should be the rule. Some women have a craving for alcoholic drinks, but these should be prohibited.

The indications for treatment are based upon the fact that the function of the sexual organs is suspended before the nervous and nutritive systems have been prepared for the change in the economy. The nutritive activities are out of proportion to the demand, and therefore the supply should be diminished. If it is not, the nutritive processes become deranged. These derangements should be treated in the usual way.

The disorders of the nervous system arising from enforced menopause from the causes now being considered are also twofold. There is in one class an exalted nerve force, which, no longer finding an outlet through the demands of the sexual system, gives rise to nervous derangements which should be relieved by sedatives, and diversion of the nerve forces in some other direction by mental occupation. Women who have given their best mental energies to the exercise of the sexual system suffer most from premature menopause.

There is another class who suffer from nervous exhaustion or debility. They manifest nervous excitability with loss of power; they are called nervous patients. All such require rest, tonics, and good nourishment. Whenever the nervous system is specially disturbed at the menopause the greatest care is required to keep its disorders from going from bad to worse. There is a tendency to develop diseases of the nervous system in many forms, and if there is any inherited tendency to insanity it will be brought out under these circumstances.

Delayed Menopause.—The menstrual function is sometimes continued to an advanced age in strong, healthy women, but so long as the function is normal there is no reason for being alarmed. It is only when the menses continue beyond the usual time for the menopause and there is some derangement in that function, or the general health is impaired, that attention should be given to the subject. Efforts should be made to discover the local or general conditions which cause these derangements. When the flow is profuse and irregular in recurrence, there is usually some local cause for it that can be easily discovered.

It may be said, in brief, that any neoplasm, subinvolution, or old injuries of the uterus may keep up menstruation beyond its normal limit. Scar tissue in the cervix uteri, either from injuries or from the use of caustics, apparently prevents the final atrophy of the uterus by keeping up a continuous irritation. This is the only way that one can account for the relief obtained in such cases by dilating the canal of the cervix. A number of cases of recovery from painful menstruation and delayed menopause have been reported cured by this form of treatment. Uterine fibroids and subinvolution, as well as scar tissue of the uterus, all belong to the domain of surgery, and are only referred to here as belonging to causation.

Delayed menopause is also caused by certain constitutional conditions, such as hepatic, cardiac, and renal disease, and also certain blood states which, if they do not favor a continuation of menstruation long after the time for change of life, certainly cause menorrhagia about the time for the menopause. Menorrhagia and delayed menopause are not infrequent in cases of mitral insufficiency. The effect of this cardiac lesion upon the circulation is to keep up a continued hyperæmia of the pelvic organs, and this often causes women to go on menstruating when they are old enough to have the menopause, and when they can ill afford to keep up that function. The diagnosis is easily made by the physician who makes his examination sufficiently thorough.

The treatment consists in trying to improve the circulation. At the menstrual period the patient should be kept in the recumbent position as long as it can be borne with comfort. She should rest, not necessarily upon her back, but on either side that is most comfortable. Massage and hot-water douches, which I do not hesitate to recommend if the flow is excessive, will sometimes control this condition. Digitalis and aromatic sulphuric acid in medium doses will frequently give great relief, and they are far better borne than hydrastis canadensis or ergot in those cases of cardiac disease.

Hepatic disease, such as the engorgement and enlargement occurring in chronic malarial poisoning, not rarely causes menorrhagia in young women, and is very apt to delay the menopause. This no doubt is also due to the deranged portal circulation, which keeps up the pelvic engorgement. The treatment, of course, should be such as the physician employs in chronic malaria. It will suffice to add here that, in addition to the use of the alkaloids of cinchona bark and arsenic, I have found the most marked benefit from the use of iodine. I give five drops of the tincture in water, with enough of the iodide of soda to make a clear solution. The formula is: Tincture of iodine, two drachms; iodide of sodium, half a drachm; simple sirup, one ounce; water, two ounces. Dose, one drachm after meals, well diluted. To this I very often add two or three drops of Fowler's solution. Of course, attention to the bowels and general nutrition should be fully given.

The premature menopause has been referred to as arising from certain constitutional affections, notably tuberculosis, and so on. Nothing need here be said about this, as suppression of menstruation is a conservative matter and requires no direct attention. It may be well to add also that in case the physician can not find any disturbance of the nutritive or nervous system to account for the delayed menopause, it is evident that the cause is local, and such patients, of course, should be relegated to the domain of surgery.

ILLUSTRATIVE CASES.

A Case illustrating the Normal Menopause.—A lady who had a very good constitution, and, with the exception of having had some acute diseases in early life, had enjoyed uniform good health. She had borne five children, and after the birth of the last one she menstruated regularly and perfectly. When she was forty-six years old the menstrual flow began to diminish in quantity and duration, varying a little in this respect from time to time. In six months from the time that the change began, the duration of the flow was reduced from five days to two. She then missed two periods, and then the flow returned and lasted three days, and was a little freer. Then she went for four months, when there was a slight show for part of a day, and that was the end.

During the time when the gradual diminution of the flow was taking place she became somewhat languid, and indisposed to her usual mental and physical activity. Her appetite was not quite as good as formerly. While languid when undisturbed, she was easily roused by any excitement. Her face would become flushed, her hands and feet clammy, and she was nervous and irritable. When these feelings passed away she felt annoyed to think that she could not control herself as in times past, and would become a little despondent. All these symptoms were more pronounced at the menstrual periods. When suffering most she felt that if she could have a free menstrual flow it would relieve her. These feelings continued to annoy her until the flow ceased entirely, and for about nine months afterward, but they diminished in severity, and finally left her altogether.

After the cessation of the flow she gained considerable flesh, and her former mental and physical activity returned, and her health has been excellent ever since.

When the diminution in the flow began and her peculiar symptoms came on, she consulted me about her condition. When told that all could be attributed to the change of life, she pleasantly accepted the situation, and made no change in her mode of life, nor did she take any medicine. This enabled me to obtain the history of the case unmodified by treatment.

Premature Menopause caused by Deranged Innervation.—The patient was one having a good organization, but a very marked nervous temperament. She had three children, the youngest of whom was five years of age when I first saw her. She was then thirty-six years old. Three years before our first consultation she had many exciting cares thrust upon her, which affected her nervous system very injuriously. Though possessed of means sufficient to secure every luxury of life, her cares depressed her greatly, and exhausted her nervous system. Her nutrition was impaired to some extent, but still she had the appearance of one in fair health, although she was restless, sleepless, had headache very often, and suffered from wandering neuralgic pains.

Her sufferings in this way had continued for about one year, during which time the menstrual flow was at times scanty, and less in duration than normal. Then the menses stopped altogether for six months, then returned for several months, though scantily, then ceased for two months, returned once, and then again in four months, and then stopped entirely.

Five months after the last menstruation was the time that I first saw her. She consulted me because she fancied that if her menses would return her health would improve. To describe her symptoms would be tedious and unprofitable; suffice it to say that she presented typical neurasthenia. There was no organic disease noticeable outside of the nervous system. Being fully satisfied that if the menstrual function could ever be restored it must be accomplished by restoring the nervous system first, the treatment was directed to that object. Sleep at night was obtained by giving thirty grains of bromide of sodium late in the afternoon, and half an ounce of whisky at bedtime. Aconitia, one two-hundredth of a grain, relieved her attacks of neuralgia. Massage and general faradization were employed daily, and tonics were given, consisting first of valerianate of zinc, then pyrophosphate of iron and arsenic, and then iodide of iron.

Citrate of iron and quinine was also given at times. The form of tonic was changed whenever she became used to that which she was taking, and the most appropriate diet was given. Her general health improved gradually, and in the summer she was able to rest and enjoy life in the country by the sea. Sea bathing was also tried after a time with benefit. About one year of this treatment restored her health, but the menses did not return. In fact, the restoration of that function was despaired of after three months' treatment, when, on examination, it was found that the organs of generation had undergone complete involution.

The Menopause delayed by Fungosities of the Endometrium.—This patient was married, and the mother of five children. After the birth of her last child she suffered from uterine leucorrhœa, probably caused by endometritis. She had fair health in spite of that, and menstruated regularly until she was forty-six years old, and then the menstrual flow became more profuse. This continued intermittently for nearly one year, when the menses came more frequently, lasted longer, and the flow was quite profuse. Her health failed gradually; she became anæmic, weak, low-spirited, and nervous. Though her flesh remained (she was rather stout), her strength was greatly reduced. Her family physician gave her the usual remedies—lead and opium, ergot, cannabis Indica, and aromatic sulphuric acid—in the hope of controlling the flow, but without effect.

Finally she consented, with some reluctance, to an examination, when a large number of polypoid growths were found in the cavity of the uterus. These were removed with the curette, and the flowing stopped for six weeks; it then returned for a few days, but was not very free. There was a return of the menstrual flow in two months, very scanty, and another in three months, and that was the end of it. She was then forty-eight years old. After the removal of the fungous growths with the curette, her health improved under tonic treatment, and when last seen, at forty-nine years of age, she was quite well.

Excrementitious Plethora, Oppression, and Derangement of the Nervous System from the Menopause.—A strong-looking German lady gave me the following history: She was married and in quite comfortable circumstances. She had six children, the youngest being eleven years old. From the time of her last confinement her health had been good, and she menstruated normally until she was over forty-six years of age. Her menses came then at the proper time, but lasted two weeks, and the flow was too free. After a lapse of three months the menses came again in a diminished degree, and again in two months scantily. From the time of her free menstruation, when she was about forty-six years old, her health failed gradually. She had always been a generous liver, and continued to take her nourishment well, but she became languid, indisposed to exertion of any kind, had headaches, was drowsy and sleepy all the time, but often had restless nights. Her mind was disturbed, so that she was depressed in spirits, quite fretful, did and said "queer things" which alarmed her family, and her memory was less reliable than formerly. She had little interest in her former duties and amusements, but occupied her time mostly in thinking and talking about her feelings. There were flushings of the face at times, which she described as rushing of blood to the head, which she fancied might kill her. There were profuse but brief paroxysms of perspiration, which came at times without any physical exertion. She was quite fleshy, and, excepting an anxious expression of the face, had the appearance of good health. The tongue was coated, the bowels constipated, the urine was loaded with phosphates; the pulse full, but slow, and at times irregular; the appetite was not good, but she took food in abundance, and drank wine and beer in the hope of getting strength. She suffered from labored digestion and flatulence, and a sense of fullness in the region of the stomach. The sexual organs had undergone complete involution, although the vagina was relaxed and showed some venous congestion.

The treatment was first ten grains of blue-mass, three grains of calomel, and one grain of ipecac, given at bed-time, followed in the morning with a dose of sulphate of magnesia. This was repeated twice, at intervals of five days, and after that the following mixture was given: Bromide of sodium, half an ounce; salicylate of sodium, two drachms; wine of colchicum seeds, two drachms; sirup and water enough to make three ounces, and a teaspoonful to be taken before meals. She improved very much on this treatment, and the mixture was continued for about six weeks. After the effects of the mercurial cathartic had passed off she became constipated, and the following pill was given at bed-time: Sulphate of quinine, one grain; extract of belladonna, one eighth of a grain; and rhubarb, two grains. When this was not sufficient to move the bowels freely, a glass of Congress water was given an hour before breakfast. Wine and beer were gradually given up, and her diet simplified and reduced in quantity. Exercise in the open air was prescribed, and light, agreeable mental occupation. The progress of the case was quite satisfactory for about two months, then there was a standstill for a time. The medicine was then changed to a mixture of hydrochloric acid, one and a half drachm; tincture nux vomica, one and a half drachm; tincture of cannabis Indica, two drachms; tincture of cardamom, one ounce; and simple sirup, two ounces; one drachm, before meals, in water. The pill at bedtime was continued. This last prescription was given for about two months with an interval of three days after each bottle, when she took the pill only, at night. From this time onward the progress of the case was steady until she finally recovered her former good health.

Such a case as this is infrequently seen in practice. The causes being conditions of life favoring derangement of nutrition and sluggish disintegration, aggravated greatly by the rather abrupt cessation of the menses.

Impaired Digestion and Assimilation arising from the Cessation of Menstruation.—This lady was married and the mother of a family, of spare habit and a nervous temperament, but her health had been good in the past. When she was forty years of age her menstrual flow diminished in quantity and duration, and simultaneously her appetite failed, and she lost flesh and strength.

Always an active person, she now became restless, nervous, and irritable. Her tongue was clean, but of a deeper color than normal, showing that rapid exfoliation of the epithelium was going on. The bowels were constipated; the urine was abundant and of light color usually. Her skin was slightly bronzed and usually dry, although she had occasional outbursts of free perspiration. Her pulse was weak, and at times irregular. Her head ached quite often, and she had wandering pains about the chest and abdomen. Her greatest trouble was a feeling of distress in the stomach after eating. Eight months from the time that the menstrual flow began to decline it stopped altogether, and two months afterward I first saw her.

As the physical condition of this patient was almost exactly the opposite of the preceding case, the treatment was necessarily very different. She was directed to take nutritious food in small quantity, six times a day; to rest as much as possible, and have massage at night, which gave better sleep.

At first she was given five grains of oxalate of cerium half an hour before meals, and a teaspoonful after meals, in warm water, of a mixture of lactic acid, tincture of columbo, and pepsin wine, and she improved so far as to take food and digest it with less trouble, but her strength did not return as fast as I desired. She was also constipated. A tonic laxative pill was then given before meals, consisting of quinine, belladonna, and compound extract of colocynth; and after meals she was given a teaspoonful of whisky with four drops of tincture of nux vomica and four grains of animal charcoal. This appeared to help her, and this course of tonic treatment was continued very faithfully for three months, when she considered herself sufficiently well without further treatment.

Two years afterward she was found to be in good health.

Circumscribed Inflammation of the Vagina and Cervix Uteri, partly due to the Menopause.—The patient was first seen when she was forty-eight years old. The menses had stopped one year and two months before. Her health was fairly good and always had been, but for some time before the menopause, and all the time after, she had been distressed by a discharge from the vagina of sero-purulent but rather tenacious material, which caused some external irritation.

There was heat and burning in the pelvis, which became more marked on walking. She had put up with her troubles so long, believing that it was due to change of life and would pass off in time. In fact, she had been told this by her physician. But, instead of disappearing, she found that the trouble increased, if indeed it changed at all. Her general health was below par considerably, but there was no organic disease of the organs of nutrition, and yet ultimate nutrition was a little sluggish.

The sexual organs had undergone final involution; the uterus was small, but the os externum was open, and coming from the canal was a tenacious, darkish-colored discharge, not unlike the leucorrhœa found in young subjects, and heretofore described under the head of "Cervical Endometritis in the Imperfectly Developed Uterus."

The mucous membrane about the external os was eroded in patches, and on the anterior lip of the cervix there were some granular spots that looked as if they were the products of epithelial hyperplasia. The appearance of the vagina was peculiar. In place of the general congestion of a well-marked vaginitis, the mucous membrane was studded with small red points or patches, while the intervening portions of the membrane were pale. The surface of the membrane was covered with a sero-purulent discharge; at the vulva there were several patches of congestion larger than those higher up in the vagina. Some of these were of a deep-red and slightly bluish color.

The thought came to me that this might be malignant disease of the cervix just beginning, but this was put aside, because of the duration of the trouble and the fact that I have several times seen this condition after the menopause.

I have also frequently seen the same conditions in young insane women who had amenorrhœa. These facts led me to suppose that the inflammatory action was due to impaired nutrition which is present at the involution of the sexual organs. This low grade of inflammatory action is no doubt more likely to occur in those who have had some ordinary cervical endometritis and vaginitis before the menopause. The circumscribed red spots looked to me like a few live coals here and there in the ashes left after the fires of functional life and inflammation had subsided.

The treatment consisted of general tonics and local astringents; citrate of iron and quinine was given internally, and a teaspoonful of sulphate of zinc in a quart of water for a vaginal douche.

The parts about the os externum were touched once with a fifty-per-cent solution of chloride of zinc. The sulphate-of-zinc injections did very well for a time, but the progress was favored by an occasional application of glycerin and tannic acid.

The local improvement did not surpass the general regaining of strength, but kept pace with it. The recovery was permanent and perfect.

Pelvic pains of a neuralgic character are common about the change of life, and are often due to it. The following two cases from Tilt will illustrate this form of trouble :

Ovario-Uterine Neuralgia.—Miss X. was forty-seven when she first consulted me. She is small, but well-proportioned. Has been highly nervous all her life. Menstruation was irregular, and there were muco-purulent discharge, vaginitis, and decided ulceration of the cervix, and a most irksome sensation of heat and irritation in the passages. I cured the vaginitis and ulceration by surgical measures, without relieving the vaginal heat and pruritus, so I sent the patient out of town. When she returned, after many months, the pruritus was as bad as ever, and would come on after any excitement or fatigue, or standing about, and would be relieved by resting with the feet higher than the pelvis. This vulvo-vaginal irritation would sometimes disappear on the coming on of a similar pruritus on the palms of the hands and on the soles of the feet, showing that however much the chief seat of neuralgia might be in the womb or vagina, the ultimate nervous expansions in other parts of the body might similarly suffer. When this irritation affects the feet and hands there is nothing to be seen there, and she refrains from scratching them because it would prolong the irritation for hours. As might have been predicted, the symptoms were worse at night, and led to great exhaustion and despondency. I have watched this state of things for twenty years, and at times could give no relief. She was always better for plenty of food and wine, and for such small quantities of citrate of iron and quinine as she could bear. I tried all sorts of injections; tar-water did most good, but it has been repeatedly advisable to discontinue all kinds of injection, for they seemed to do more harm than good. I syringed the vagina with a solution of nitrate of silver and touched the passage with the solid caustic, with questionable benefit. A rectal suppository containing a grain of opium and one of extract of belladonna often gave temporary relief, but this remedy could not be relied on. By the sacrifice of her own health many a daughter has well repaid the gift of life; and when my patient lost her mother, who had been long a cripple, requiring anxious and fatiguing nursing, she went out of town and got fat, and now suffers much less, only having a slight return of the old symptoms when she gets weaker and more nervous.

Ovario-Uterine Neuralgia.—A very strongly constituted lady, aged forty-seven, is said to have had some acute uterine disease twenty years ago, while residing in France, when forty leeches were applied above the pubis. With the exception of not being able to retain the urine so well as previously to this attack, health remained so good that every year she was able to take long pedestrian excursions with her husband. She never conceived, and menstruation ceased suddenly at forty-four; in the following months the nose bled very frequently, and the bowels became constipated; for which she went to Homburg and was restored to health. On returning to town, in December, 1868, she took very cold enemata for constipation, which was so great that a wineglass of Friedrichshall water, taken every hour, failed to produce watery motions, and only irritated the bladder, apparently causing the strange abdominal sensations which have lasted ever since. The patient feels as if there were a heavy body in the pelvis bearing down upon the rectum, with a burning sensation, referred sometimes to that organ, sometimes to the vagina, or to the bladder. When in bed and lying down, with the feet up, she feels comfortable; by the time she has half done dressing the burning sensation begins, and lasts until the bowels have been moved; soon after this the burning comes back; it is aggravated by standing or sitting, by indigestion, flatulence, constipation, and repletion of the bladder; also by worry and bad news. The sensation is relieved by moderate walking, by lying down, and by regularity of the bowels. Homburg was again tried; it did good, but on her return the lady was as bad as before, and consulted several doctors. One attributed the sufferings to stricture of the rectum, another to irritation of the bladder, a third to displacement of the womb. The following summer Homburg was tried for a third time, but the waters were soon left off, for they aggravated all the symptoms, and after the patient's return to town Dr. Beale sent her to me. In addition to the pelvic symptoms already described a strong-minded, sharp, matter-of-fact woman was in a state of mental confusion; her brain felt muddled, and she would sit for hours dozing or doing nothing; despondency being doubtless increased by finding herself helpless as a child, after having passed all her life in doing everybody else's business as well as her own. She forgot where she put things; once thought she had taken out a large sum of money in her purse, and that she had lost it, whereas a month afterward she found it in some out-of-the-way place. On examining, I found the rectum perfectly healthy, notwithstanding the pain and stricture ascribed to it. I was given to understand that marriage had never been concluded, and the vagina was so narrow that I could with difficulty introduce part of my index finger; so I ordered linseed tea and laudanum injections, three times a day, and henbane internally. A few days afterward I was able to reach the os uteri. I found the womb exquisitely sensitive; and on sounding the bladder there was nothing abnormal, except great pain when the sound passed over the urethra, the pain not being caused by inflammation, for the finger in the vagina did not feel the urethra as a hard and round body painful on being pressed. Injections with acetate of lead and laudanum, as well as opium and belladonna rectal suppositories, enabled me, a little later, to examine the womb without giving pain; there was no ulceration and there had been little vaginal discharge. The pain was most felt at the opening of the vagina, which looked sore, red, and injected, a condition that accounted for a very unusual hardness of the recto-vaginal tissues, a hardness of which the patient was sensible, and complained of as something wrong with "the bridge." This was caused by long-continued congestion, although the parts were then without heat or redness. This sore state of the vaginal opening was relieved by the application, twice a day, of zinc ointment, to each ounce of which was added a drachm of diluted hydrocyanic acid. Vaginitis becoming worse, I swabbed the vagina once a week with a solution of nitrate of silver, and ordered alum and zinc injections; suppositories did harm, whether administered by the vagina or the rectum. After thus treating the patient for a few months the sensations of burning and weight had considerably diminished, but were often troublesome. Digestion was much improved by nitro-muriatic acid and pepsin; pseudo-narcotism and mental disturbance were not relieved by bromide of potassium, but were much reduced by henbane and Indian hemp; and then the patient took, for two months, three times a day, at meals, the twenty-fourth of a grain of arseniate of iron, made into a pill with a fourth of a grain of Indian hemp—a combination suitable alike to the general nervous derangement and to the abdominal neuralgia. This leads me to the question of diagnosis. There was no organic disease of the bladder or rectum, nor of the womb, neither displacement nor ulceration of this organ. The disease originated in vaginitis, kept up by excessive walking and drastic medicines at the change of life; the vaginitis causing neuralgia of both the sensory and the ganglionic pelvic nerves, the neuralgia causing pseudo-narcotism and the other forms of cerebral disturbance that usually attend the menopause; the neuralgic element of the case being shown by the patient's often feeling the disturbance to ascend, as it were, from the pelvis along the spinal column to the back part of the head, where there was most suffering. There was a gradual recovery of health, and this patient has been able to resume her usual very active life.

A long list of diseases has been given as occurring at the menopause. This list covers nearly all the ills that flesh is heir to. The majority of these have no relations to the menopause excepting that when there is a predisposition to any disease, the disturbances of the system due to the change would favor the outbreak at that time.

No notice need be taken of those affections which are common to all periods of life, the menopause only determining the time of their development. When there exists a predisposition to any of the constitutional diseases, the condition of nutrition at the menopause, and the disturbed or unbalanced state of the nervous system, favor the outbreak of these morbid tendencies.

CHAPTER XXIV.

SENILE ENDOMETRITIS.

THE prevailing opinion is that cancer is the only disease of the uterus to be looked for after the menopause. There is a decided immunity of the uterus from inflammatory affections in aged women. In the past and present, authorities have agreed in stating that endometritis ends in recovery at the change of life. These opinions are true only to a certain extent. I have seen a number of cases of endometritis which persisted, in a modified form, after the menopause, and a considerable number in which this affection appeared long after the climacteric. The pathology and natural history of endometritis in advanced life differ so from inflammatory affections of the uterus in middle life that I concluded, eighteen or twenty years ago, that senile endometritis was a special, distinct affection worthy of more attention than had been given to it. Fritsch, in Billroth's "Handbuch für Frauenkrankheiten," treats of this affection, and three or four others have referred to his contributions, and that is all I can find in the literature; even at the present time there are only four or five authors who make any allusion to it.

The subject was first brought to my notice most forcibly in the year 1875. A patient, the relative of a physician, aged sixty-eight, came under my care while suffering from a sero-purulent discharge from the uterus. I made a diagnosis of cancer, but found I was mistaken. She recovered, but I could see that this affection differed from endometritis as it occurs in middle life. From that time I have kept such cases carefully under observation, and I have collected facts sufficient to complete the natural history of the disease.

Pathology.—The inflammation may be limited to the cervix alone, but as a rule it involves the entire mucosa. When it occurs soon after the menopause, and especially if it is a continuation of a cervical endometritis that existed before the menstrual function is finally suspended, it assumes a catarrhal form modified. As usually seen, it is suppurative, the discharge being sero-purulent. When it begins as a catarrh it gradually progresses to a suppurative form. In the catarrhal form, the discharge, at first a leucorrhœa, diminishes, and changes from the translucent tenacious discharge to a darker glue-like material, associated with a sero-purulent matter. The change results from the atrophy of the glands of Naboth, which secrete the leucorrhœal discharge of catarrhal endometritis. The character of the discharge is modified first by the atrophy which follows the menopause, and by changes of structure which are produced by the disease itself. It is not until the senile involution is complete that the pathological anatomy of the disease is fully developed, and shows the characteristics which distinguish this affection from all other forms of endometritis.

There is first a general atrophic thinning of the whole mucous membrane. The epithelium changes from ciliated to cylindrical, then pavement, and finally is almost entirely lost. The surface around the os externum becomes irregular, thin, and shows a bluish-red color, which presents a marked contrast to the appearance of erosion seen in endometritis of early life. Granulations of low vitality appear on the endometrium, and minute extravasations of blood occur and are seen as small pigmentation spots. The glands become obliterated entirely by the morbid process, and hence there can be no secretion, but, instead, pus formation. There is molecular death of the structures, but extensive ulceration is rare. During the development of this affection the atrophy of the muscular structure of the cervix proceeds faster than in the mucous membrane of the cervix, and there is an inversion of the membrane which gives a peculiar appearance. Around the os externum there is an elevated bluish-red ring, which stands out in marked contrast to the normal mucous membrane of the vagina. Laceration of the cervix uteri frequently accompanies senile inflammation, and when there is much scar tissue present the suffering is more marked. Stricture, partial or complete, at the os internum or externum is frequently formed. Closure of the os internum is caused in some cases by retroflexion of the uterus. In this condition the discharge is intermittent. For a number of days the flow stops, and then a free discharge of offensive pus takes place. Complete occlusion of the canal is caused by adhesions of the disintegrated mucous membrane—a result which follows suppurative inflammation of the mucosa, but is rarely, if ever, present in catarrhal forms of inflammation. Pus accumulates above the stricture and distends the body of the uterus, giving rise to a condition which resembles an abscess in pathology, symptoms, and signs. If the stricture is not extensive the pressure will force it open, pus will be discharged, and there will be repetitions of the closure, accumulation, reopening, and discharge. In most cases it is necessary to open and dilate the canal before relief can be obtained. When the disease has existed long enough to destroy the mucous membrane it may end in cicatrization, but there is a marked tendency to continued suppuration. The disease can hardly be called self-limiting.

In nearly all the cases that I have seen in which there has been, for a time, a stenosis of the canal, the uterus has become greatly distended and prolapsed or retroverted. The cavity of the uterus measured three inches and a half in one case and four inches in another. The senile atrophy may be delayed by the presence of endometritis, and the uterus may remain larger than it should be in old age, but that does not account for nor is it like the enlargement from distention. In the enlargement of the cavity from distention with pus the walls become very thin, while in the other the normal thickness of the walls continues.

Causation.—A continuation of endometritis, acquired before the menopause, accounts for a certain number of the cases, especially of those in which the disease is limited to the cervix. Some of the severer cases, in which the disease involves the body of the uterus, are caused by displacements, prolapsus, or retroversion, especially retroversion. Prolapsus in a marked degree exposes the cervix to irritation, and, if it continues for long, inflammation and ulceration will appear around the os externum, and the mucous membrane of the canal becomes involved. The atrophy of the cervix is retarded, or else infiltration takes place and keeps the cervix enlarged. These cases are easily controlled in case the displacement can be relieved. Corporeal endometritis is frequently caused by retroversion. The displacement interrupts the escape of the secretion of the mucous membrane; its retention causes decomposition and inflammation of a purulent variety. Stricture at the os internum would cause inflammation in the same way as retroversion, and the two are often found together, but in the majority of cases the occlusion is the result of the inflammation.

Acute or latent gonorrhœa may cause this form of endometritis, but I am not sure that I have ever seen a case of acute gonorrhœal endometritis after the menopause. Old neglected cases I have seen several times.

Senile vulvitis and vaginitis, due to malnutrition and inattention to cleanliness, extend and cause endometritis in advanced life, but, as the latter very often is the cause of the former, it is difficult to decide in a given case whether the disease began in the uterus or vagina. Fibromata of the uterus act as a very important cause of the affection. Although uterine fibromata frequently disappear after the menopause, the endometritis which accompanies the neoplasm continues, but changes from a catarrhal to a purulent form. One patient who had a small fibroid passed the climacteric, and was free from all uterine disease until she was sixty years old. She then developed an endometritis attended with such a profuse sero-purulent discharge that she sought relief of her family physician. He made a diagnosis of cancer, and she was brought to me for operation. I found the remains of the fibroid in the cavity of the uterus. It was removed, and though the serous element of the discharge subsided at once, the endometritis persisted, and only yielded to treatment after several months.

I have often wondered why the surgeons who find so many charges against fibromata, such as their danger to life and health, have never found senile endometritis caused by them. Perhaps they have overlooked this matter, or it may be that these are cases which they have mistaken for cancerous.

Fibromata cause endometritis after the menopause by delaying senile atrophy and also by sloughing, which takes place in rare cases. Catarrhal endometritis usually accompanies fibromata and changes to the purulent variety after the menopause, as already stated.

Another curious fact is that, although the fibroid that causes the metritis may slough and come away, or become pedunculated and the surgeon remove it, the metritis continues. This is the opposite to that which occurs in middle life. If a fibroid is removed in a young subject, the endometritis usually subsides when this cause is removed. I saw one lady, fifty-four years old, who had a submucous fibroid of the uterus. She had a well-marked endometritis, which was being treated without benefit. The fibroid sloughed and was completely removed. She had septicæmia, from which she recovered, but the purulent endometritis persisted, and only yielded to treatment after long-continued efforts. I supposed that the metritis in that case was obstinate owing to its being caused by sepsis, but I found that a like inflammation might be set up with only the presence of a fibroid to account for it. A patient sixty years old had, judging from her history, a catarrh of the uterus at the menopause. It continued in a changed form, and a short time before I saw her she became worse, had more severe pelvic pains and tenesmus, with a very free sero-purulent discharge. I expected to find an endometritis and prolapsus, but found a small, pedunculated fibroid that had been expelled from the body of the uterus and occupied the dilated cervix. I removed it, and the patient was relieved and improved, but the endometritis of the purulent form continued, and, although much less severe, was difficult to cure.

Symptomatology.—The symptom which first attracts attention is a discharge which varies in character according to the extent and stage of the inflammation. When a cervical endometritis is present at the menopause the characteristic leucorrhœa gradually disappears, or else changes to that of the senile form of the affection. The tenacious secretion of the cervical glands is replaced by a sero-purulent discharge which is more like a vaginal leucorrhœa. The discharge, sooner or later, causes a subacute or senile vaginitis and vulvitis. There is so very often prolapsus of the vaginal walls and uterus complicating the metritis that there is pelvic tenesmus and some disturbance of the vesical and rectal functions.

These are the chief symptoms in the early stage of this affection when prolapsus is the only complication. When the uterus is retroverted, and owing to imperfect drainage the products of inflammation accumulate and distend the uterus, there is more pain and the constitutional disturbance is much more defined. There is often a rise of temperature, and the pulse increases. The digestion is deranged and ultimate nutrition impaired in cases of long standing. This is due to pain, reflex disturbance, and more especially, perhaps, to a slight chronic sepsis. The malnutrition increases the appearance of premature old age, and the dry, bronzed appearance of the skin is suggestive of malignant disease. In cases in which true stenosis takes place at the os internum or at any point in the canal of the cervix, the symptoms are usually very pronounced. The pain is acute, and compels the patient to rest in bed. The pain differs from that of acute pelvic inflammation in being slight at first but gradually increasing, while the pain of acute disease is violent at first and gradually subsides. The constitutional disturbance is more marked in this condition or complication than in any other. There is symptomatic fever. In one of my patients the temperature reached 102° F. I have already stated that stenosis may be the cause or consequence of the metritis. The imprisoned secretion and broken-down tissue cause the inflammation, or the stenosis may be caused by the inflammation. That accounts for the fact that in some cases the distention of the uterus and the symptoms are gradually developed, but in others they come on somewhat more abruptly.

Physical Signs.—Inspection shows, in most all cases, patches of inflammatory redness about the vulva which are peculiar to senile vulvitis; the contrast between the red portions and the anæmic appearance of the membrane generally is well defined. With the aid of the speculum the signs of the same form of vaginitis are observed. Of course the vagina and vulva are not involved in all cases, but as a rule they are. In quite a few it has been limited to the upper part of the vagina, and mostly the vaginal portion of the cervical membrane. The character of the discharge is best studied through the speculum. Its character is of much value as a sign. Indeed, upon this evidence senile endometritis is distinguished from other affections and forms of inflammation, such as cancer and gonorrhœa. The appearance of the discharge differs from uterine leucorrhœa in being less tenacious, owing to the absence in varying degrees of the secretion of the glands of the cervix. The color also indicates the composition to be sero-purulent, and in this it is more like the discharge in specific inflammation, and is similar in appearance to that found in the early stage of cancer. The differentiation between the discharge in senile endometritis, specific metritis, and cancer must be made by the microscope if one would make the distinction at once—i. e., without waiting for the full development of the history. In senile metritis, pus, serum, disintegrated tissue, and changed or broken-down epithelium and bacteria are found. In cancer the discharge is sero-sanguinolent, and later in the progress of the disease contains broken-down necrotic tissue and elements of the neoplasm. The gonorrhœal discharge can be distinguished by the specific germ of that affection. Without the aid of the microscope it is impossible to make a positive diagnosis between the specific or non-specific origin of senile endometritis, but fortunately the indications for treatment are the same whatever the cause of the affection may be. The history may show that gonorrhœa is the probable cause, especially if the disease comes on abruptly, was acute at first, and involved the vulva and urethra first.

The differentiation between this affection and cancer of the cervix is made by observing that in cervical endometritis there is the characteristic discharge and degeneration and atrophy of the mucous membrane, and in cancer there is, in addition to the discharge, infiltration of the tissues—i. e., neoplastic growth. When the disease is fully developed in the body of the uterus the clinical history resembles malignant disease, but can be readily diagnosticated by the fact that pus in quantity accumulates in the cavity of the body of the uterus in metritis, while that never occurs in cancer. By aspirating the uterine cavity the material drawn off will be pus, and perhaps a little blood, while in cancer it is serum, blood, and broken-down cancer tissue. The aspiration is easily made by using a small curved pipette with a rubber bulb at the end. By compressing the bulb and introducing the pipette and removing the pressure, enough material can be withdrawn to show its character and decide the diagnosis. Of course, if a microscopical examination can be obtained by an expert the diagnosis can be made much more certainly. The history of the progress of the disease aids in the diagnosis. Cancer progresses steadily, but metritis continues about the same, or slowly yields to such treatment as will have no effect in retarding or curing cancer. Adenoma may be mistaken for senile endometritis, but the differential diagnosis is easily made. Adenoma uteri occurs earlier in life, generally about the menopause, and is attended with menorrhagia or metrorrhagia as the most marked symptom. This difference is diagnostic, because menorrhagia does not occur in this form of metritis. There is not, as a rule, any purulent discharge in adenoma. By using a small curette a portion of the adenomatous growth can be removed for examination which will complete the diagnosis.

Treatment.—When the disease is confined to the cervix a douche of a solution of borax, three drachms to the quart, gives much relief and prevents the discharge from keeping up vaginitis. Sulphate of zinc, one drachm to the quart of water, is very effective in case the borax fails. The hot-water douche, as used in uterine disease generally, is not of much value in the senile form. If there is any prolapsus or other displacement it must be corrected by the use of medicated tampons until the inflammation is relieved. Sterilized absorbent cotton covered with boroglyceride, glycerin and tannin, or white vaseline answer the purpose. I have tried prepared wool for tampons, but it is more irritating and has to be changed more frequently. Astringent and alterative applications are useful in relieving the cervical inflammation, but any caustics, even the mildest, do harm rather than good. I have most faithfully tried carbolic acid and iodine, which are so effective in ordinary metritis, but these agents are not satisfactory in the senile form of the disease. One or two applications of a combination of carbolic acid and tincture of iodine may do good, but it should not be repeated many times. All caustics rather encourage the breaking down of the atrophied tissue, and when the slough separates the surface left does not incline to heal, but to suppurate. The best results have been obtained from the use of boroglyceride with tannin, glycerin and tannin, fluid extract of hydrastis canadensis and a mild solution of acetic acid, one drachm to two ounces. The canal should be thoroughly washed out with clean water and the application made with a pipette.

I generally begin the local treatment with dilute acetic acid or tincture of iodine four parts, and carbolic one part; an application of either of the above twice in the first week. This answers the best when the discharge is very free. Following this, a mixture of twenty grains of tannic acid in an ounce of boroglyceride. This is a thickish material which is difficult to apply. I manage by warming the mixture and using a pipette with an opening in the end as large as the size of the glass tube will admit. Tannin and glycerin were used almost altogether some years ago; now I prefer the boroglyceride and tannin. The fluid extract of hydrastis canadensis is easily used and has a very good effect, and I fall back on that when the others do not do well. Iodoform is the most efficient, and when it can be freely and properly applied supersedes all other agents. Indeed, were it not for its being difficult of application to the canal of the uterus it would meet all requirements. I have only used other remedies, such as I have mentioned, because they were so much more easily applied and have not the offensive odor of iodoform. I was first led to use iodoform in senile endometritis by observing its remarkable effects in the treatment of ulcers in general surgery. Dr. Fordyce Barker used it in cases of cancer of the uterus with great benefit. He used iodoform suppositories made in convenient form to introduce into the uterus. The results that he obtained were so favorable that I am now inclined to believe that some of the cases that he believed to be cancers were really cases of senile endometritis. Many gynæcologists have made that mistake in diagnosis, and it is no disparagement to suppose that Dr. Barker may have occasionally fallen into the same error. I presumed that the effect of iodoform was due in a measure to its antiseptic qualities, but learned that it was not a germicide to any degree sufficient to explain its effect in checking suppurative inflammation. The "Bulletin Général de Thérapeutique" contains a full discussion of the subject.

"Maurel, who is well known by his researches on the leucocytes, has undertaken to solve the problem why iodoform, which is so efficacious in preventing or suppressing suppuration, should apparently have so little action on the pyogenic staphylococci.

"He first experimented with a virulent culture (on *gélose*) of staphylococci in the presence of leucocytes. The latter speedily absorbed the staphylococci, but succumbed in less than two hours. In the control field, however, they accomplish their evolution and live from twelve to twenty-four hours. Maurel finds that the death of the leucocytes under the influence of the pus micro-organisms is due to a toxine contained in the bodies of these microbes, not to the mechanical action of the staphylococcus or to the products which the latter yields up to its environment. Under the influence of these same staphylococci, the red corpuscles become diffluent in fifteen hours and then disappear.

"Another series of experiments were made by subjecting the figured elements of the blood to the action of iodoform in the dosage of ten to two and a half per kilogramme of blood. Neither the smaller nor the larger doses were found to be toxic to the leucocytes; the vital activity of these latter was, on the contrary, augmented, and the action on the red globules was nil.

"A third series of experiments show iodoform to be without marked action on cultures of the staphylococcus aureus and albus.

"In a fourth series of researches Maurel subjected both the leucocytes of human blood and cultures of the staphylococcus to the action of iodoform in varying proportions and under varying conditions. His conclusions are as follows:

"1. Iodoform attenuates the virulence of the staphylococcus. While in the virulent state, this micrococcus kills our leucocytes in less than two hours; when it is subjected along with the leucocytes to the influence of iodoform, the latter preserve their movements for eight hours at least, and even complete their evolution.

"2. The staphylococci, which have thus lost a great part of their virulence (and to such a degree that they are seemingly devoured by the leucocytes with impunity), keep all their reproductive energy unimpaired, so that virulence and the power of reproduction are independent properties.

"A final conclusion is deduced that it is in both these ways—according to Maurel it is by augmenting the energy of the leucocytes and attenuating the virulence of the pus microbes—that iodoform opposes suppuration, which is, in the language of bacteriology, a massive slaughtering of the leucocytes."

These teachings are in harmony with clinical experience as to the benefits of iodoform in preventing or arresting suppuration.

There is considerable difficulty in applying iodoform to the cavity of the body of the uterus in sufficient quantity to be effective. Suppositories made with cacao butter are not retained in the cervix, and, although they remain in the cavity of the body for a time, there is not enough retained to give the full effect. I have used a solution in boiled linseed oil, and also an ether solution, but the latter causes much irritation, and the former does not hold enough of the iodoform. The best is the dry fine powder, which can be introduced through a small cannula. The next best (and more easily introduced) is the fine powder held in suspension in acacia and water by agitation and then instilled with a pipette.

When the disease (limited to the cervix) is complicated with scar tissue resulting from old lacerations, I have operated with the result of relieving some of the neuralgic pain, and with benefit to the inflammation. It is difficult to get good and prompt union. In fact, some of the operations have been failures.

The treatment of the corporeal form of this affection is rendered more difficult by certain complications, such as prolapsus, stenosis of the canal, or retroflexion. Complete closure of the canal, of course, must be relieved first by dilatation, to afford room for washing out the uterus and subsequent drainage. When the stricture is at the os internum, time and patience are necessary to open the canal. This, if possible, should be accomplished by dilating the canal below the stricture and then pushing a very fine probe through the stricture. There is danger in puncturing the stricture with a knife, because it is difficult to determine the direction of the canal, and hence danger of puncturing the wall of the uterus. Gradual dilatation is best. Owing to the friable condition of the uterine tissue laceration is sure to occur if forcible dilatation is practiced. When an opening has been made large enough to pass a uterine sound, a piece of gauze should be introduced to keep the parts from contracting. Better still is a tent of elm bark, carbolized before use. This tent is bland, sterile, and swells a little, which keeps up dilatation. When the cervix is dilatable, the canal should be made large enough to admit a reflex catheter. The uterus should be washed out with a five-per-cent solution of carbolic acid and then packed with iodoform gauze. The packing should be left in forty-eight hours, if there is no severe pain and rise of temperature. Upon removing the gauze the uterus should be washed out with boiled water, and iodoform powder introduced in the way described in the treatment of cervical endometritis. Owing to the difficulty of handling iodoform I have used peroxide of hydrogen and found it very useful. When a reliable preparation can be obtained it gives most satisfactory results, providing it is used twice or three times a day.

Owing to the difficulty of obtaining reliable preparations of peroxide of hydrogen, and the fact that it is easily decomposed by heat and exposure, I have lately used a preparation made by McKesson & Robbins. It is an aqueous solution of dioxide of hydrogen. It is called pyrozone. A three-per-cent solution is the one which I have used. I have not had sufficient experience so far to enable me to say that this pyrozone is all that it is claimed to be.

In cases complicated with retroversion the malposition must be corrected in order to be able to wash out the uterus thoroughly and to keep up drainage. The treatment of retroversion is very difficult when the vagina is contracted, as it usually is after the climacteric—in fact, it is impossible to replace the thin-walled uterus that is distended with the products of inflammation. Thorough dilatation and evacuation must first be made, and then by the use of a tampon or a soft ring pessary the posterior vaginal wall may be carried backward far enough to keep the fundus uteri from falling downward below the level of the cervix. Free drainage may be obtained although the uterus may still be retroverted in a slight degree. Prolapsus also requires to be corrected.

Both patient and surgeon are likely to become discouraged with the treatment, which is sure to be tedious, especially if not well understood. This has raised the question in my mind whether hysterectomy would not be justifiable in the worst cases. I have seen the uterus removed, supposedly for cancer, but really in senile endometritis, and the results have been good. Still I would prefer to employ the treatment recommended here, and not until that had failed would I resort to hysterectomy.

In cases of senile endometritis complicated with complete prolapsus, vaginal hysterectomy is the proper treatment in all cases excepting in those whose general health presents a contra-indication. Dr. Edebohls has done hysterectomy in cases of complete prolapsus, and although I have succeeded in relieving such displacement in the majority of cases without removing the uterus, I resort to hysterectomy without the least hesitation, and with confidence in the results, in cases of senile endometritis and complete prolapsus.

CHAPTER XXV.

DISEASES OF THE OVARIES.

THE ANATOMY AND PHYSIOLOGY OF THE OVARY.

THE ovaries are two bodies, in shape somewhat like an almond, situated in the pelvic cavity, one on either side of the uterus, and removed from it about one inch. They are connected with that organ by the Fallopian tubes and the ovarian ligaments. Before birth the ovaries are on a level with the iliac fossa, and it is not until the tenth year of life that they reach what may be considered their permanent position—that is, the lateral and posterior part of the true pelvis. Hasse, of Breslau, in a female cadaver frozen in the upright position, found that the long axis of both ovaries ran outward and forward, forming with the transverse axis of the uterus an angle open to the front, with one half of the organ projecting above the plane of the pelvic brim. Schultze, on the contrary, regards the long axis of the ovaries as being in an antero-posterior position, as shown in Fig. 208. It must be borne in mind, however, that the position of the ovaries is not a fixed one; their relation to the uterus and the other pelvic organs is such that, when any one of these is displaced, a change in the position of the ovaries will of necessity occur; thus the full or empty bladder or rectum acting upon the uterus will tend to push the ovaries in one direction or another. The average dimensions of each ovary are: Length, one inch and a quarter; width, three quarters of an inch; and thickness, half an inch. Its weight is about eighty grains. As its position changes, so do also the measurements here given. It is probably in its most perfect condition in the virgin at about the age of puberty. According to Hennig's observations, the ovary increases in length during pregnancy, but neither its

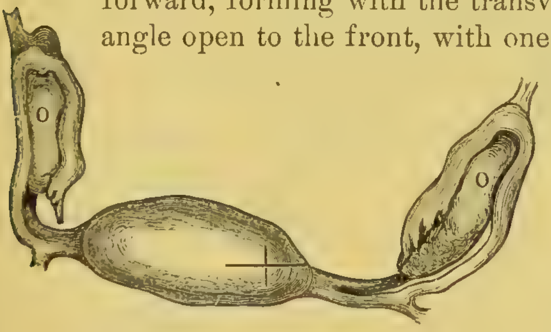

FIG. 208.—The fundus uteri and ovaries seen through The pelvic brim (His). The cross is in the center of the pelvis and on the fundus; *o*, *o*, ovaries encircled by the Fallopian tubes in their backward sweep.

breadth nor thickness exceeds that found in the virgin. When pregnancy has ceased the ovaries become smaller, and do not at any time subsequently regain the dimensions possessed by the virgin ovary.

The relation of the ovaries to the broad ligament is a matter of great importance and interest. These ligaments consist of two folds or layers of the peritonæum, with a lining of muscular tissue, between which lie the uterus and its appendages. The ovaries, however, are not situated between these two layers, but are suspended, so to speak, from the posterior surface of the posterior layer, and are therefore entirely behind both layers or folds of peritonæum, which form the broad ligament, but attached to the posterior layer by their long axis, this attached portion of the ovary being termed the hilum. In the anterior face of the posterior layer of the broad ligament, on either side, is an opening or slit through which the blood-vessels, nerves, and lymphatics of the ovary pass. The ovarian ligaments which connect the body of the uterus and the ovaries, leaving the former at a point between the Fallopian tubes and the round ligaments, after running for some distance between the two layers of the broad ligament, pass out by these openings in the posterior layers to the ovaries. These ovarian ligaments are about one inch in length, and are composed of fibrous tissue, into which some of the uterine muscular tissue is prolonged (Fig. 209). Each ovary is also connected with the

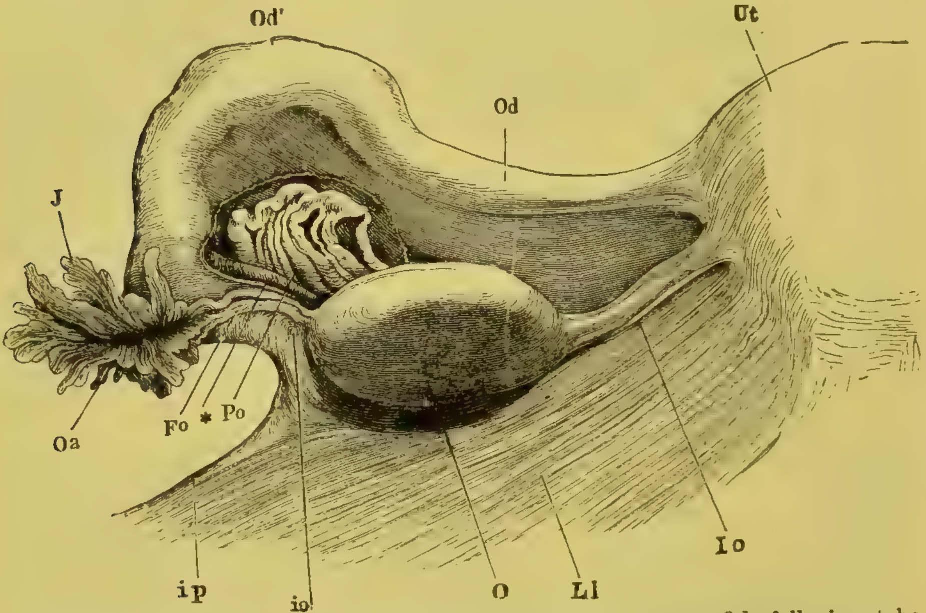

FIG. 209.—The ovary and its ligaments (Henle). *Ut*, uterus; *Od*, fallopian tube; *Io*, ovarian ligament; *ip*, infundibulo-pelvic ligament; *io*, infundibulo-ovarian ligament; *Fo*, fimbria ovarica; *Po*, parovarium.

corresponding Fallopian tube by one of its fimbriæ, and through this to the pelvis by means of the infundibulo-pelvic ligament—a ligament about two thirds of an inch in length, running from the outer end of the Fallopian tube to the wall of the pelvis. Thus the ovary is maintained in its position—subject, however, to considerable alteration—by the broad, the ovarian, and the infundibulo-pelvic ligaments.

The supply of blood to the ovaries is by the ovarian artery, a branch of the abdominal aorta corresponding to the spermatic artery of the male.

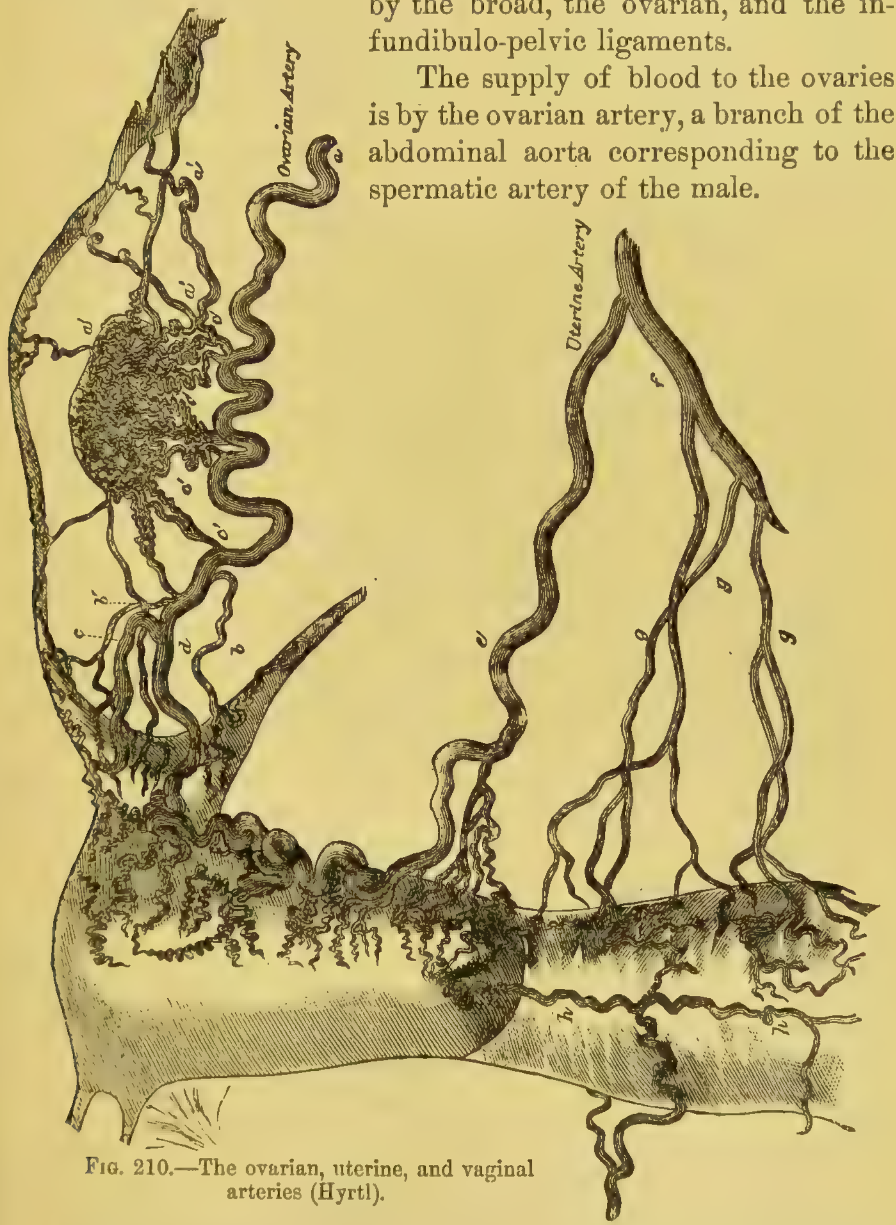

Fig. 210.—The ovarian, uterine, and vaginal arteries (Hyrtl).

After this artery enters the pelvis it passes between the layers of the broad ligament in a direction toward the upper angle of the uterus; its course is parallel to, though below, the Fallopian tube. It sends branches to the ovary, which pass out from between the layers of the broad ligament to the ovary through the opening in the posterior layer already referred to. Other branches supply the Fallopian tube and anastomose with the uterine artery. The venous blood of the ovary passes into the ovarian plexus, sometimes spoken of as the pampiniform plexus, which is situated between the layers of the broad ligament, and is thence carried to the inferior vena cava on the right side, and to the renal vein on the left. These veins, which form a network in the ovary, have, according to Rouget, associated with them muscular trabeculæ, which, in their contraction, prevent the passage of the blood from the ovary into the large venous trunks, and thus permit of what may be termed an erection of the ovary. It is probable that during the act of coition such a condition takes place in the ovary, increasing its size to a considerable extent, and causing it to become firmer and more sensitive. Rouget describes the lymphatics of the ovary as united into six or eight trunks, which accompany the ovarian artery, and discharge into the middle and superior lumbar lymphatic ganglia. The lymphatic circulation becomes of special importance in explaining the method by which, under certain conditions, septic matter is absorbed, producing septicæmia. The ovarian and uterine plexuses communicate, as do the arteries of the same names.

The nerves of the ovaries, as well as those of the uterus, arise from the cœliac plexus, which is in part distributed to the ovaries and to the spermatic ganglia. According to Frankenhäuser, the superior mesenteric plexus supplies these spermatic ganglia, which Courty suggests would be better called genital ganglia. These ganglia, four in number, are supplied from the sympathetic through two large branches, and in turn supply the ovaries through a considerable number of branches.

Development of the Ovary.—At a very early period in the development of the fœtus two bodies are formed in the abdominal cavity, one on each side of the spinal column; these are the Wolffian bodies, the function of which is undoubtedly similar to that of the adult kidney. According to Coste, they are fully formed at the end of the first month, and according to Longet, are hardly visible after the second month. While these organs are in a state of activity the kidneys are formed behind them, and at the same time two other organs appear in front of the Wolffian bodies, and on their inner side; these are the internal organs of generation—the testicles in the male and the ovaries in the female. The detailed history of the development of these organs is as follows: At a very early stage of development—in the chick as early as the third day—the cells of the mesoblast form a longitudinal cord in the mesoblast, one on each side of the body, and just external to the protovertebræ, which are also formed from this same layer. These cords are at first solid, but a cavity gradually forms within them, and they become the Wolffian ducts. From this primitive tube diverticula are given off, forming, as it were, blind tubes, into which blood-vessels enter, and with the diverticula form the Wolffian bodies, one upon either side. Another portion of the mesoblast projecting in the form of a ridge, and covered with "germ epithelium" on the inner side of the Wolffian body—that is, toward the median line—becomes the testicle or the ovary, according as the individual is to be of the male or female sex. On the outer wall of the Wolffian body an involution takes place from the pleuro-peritoneal cavity, forming at first a furrow, but later, by the union of its edges, a duct, which is known as Müller's duct. In the female these ducts form the Fallopian tubes, the uterus, and the vagina, while in the male they have no special function, although the upper part remains as the hydatid of Morgagni, and the lower as the prostatic pouch, the uterus masculinus, or sinus pocularis. While the Wolffian ducts in the male form the body and globus minor of the epididymis, the vas deferens, and the ejaculatory duct, in the female the lower part only remains to form the duct of Gaertner. If the broad ligament is examined with transmitted light, a cone is seen nearly an inch in breadth, of whitish, more or less convoluted tubes, in number about twenty, each of which is lined with ciliated epithelium and contains a clear fluid (see Fig. 209). This is the parovarium of Kobelt, or the organ of Rosenmüller, and is the remnant of the Wolffian body of fœtal life. The pathological degeneration of these tubes produces the parovarian cystic tumor. The ovary itself consists of the oöphoron and the paroöphoron; the latter must not be confounded with the parovarium. Fig. 211, taken from Bland Sutton, will make this distinction clear. The paroöphoron is made up of fibrous

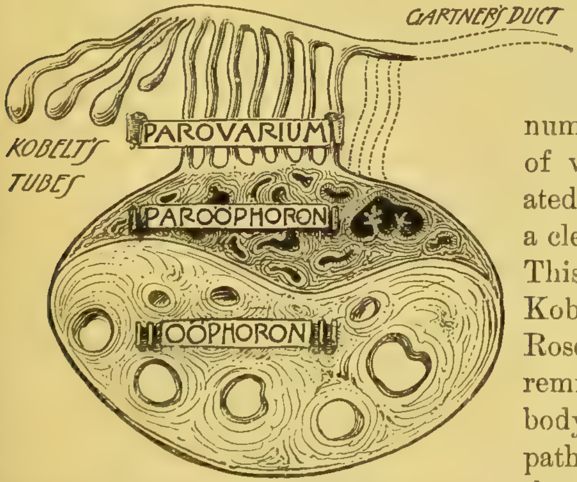

FIG. 211.—Diagram representing the cyst-regions of the ovary (from Bland-Sutton).

tissue and blood-vessels. In it are developed paroophoritic cysts, which will be described later.

Minute Anatomy of the Ovary.—The fact that the ovary is situated behind both layers of the broad ligament, and attached only at the hilum, has already been referred to. From this it follows that the posterior surface of the ovary is not covered by peritonæum. The more thorough and skillful investigations of recent years have satisfactorily demonstrated that the surface of the ovary is in appearance and structure very different from the peritonæum. While the epithelium which covers the broad ligament is transparent and flattened, that which forms the surface of the ovary is granular in appearance and columnar in form. This marked difference has suggested to some that the covering of the ovary was a mucous rather than a serous membrane. These columnar cells are very similar to those lining the Fallopian tubes, except that the cilia which are present in the latter are wanting in the former. It is an error to regard these superficial cells of the ovary, which are arranged in a single layer, as in any sense a covering of the ovary. They are in reality an integral part of the ovary, and, as the name "germ epithelium" implies, their function is a most important one, being none less than the formation of the ova by a modification of their structure, as has been so well described by Waldeyer.

Beneath this layer of germ epithelium is the tunica albuginea. This is made up of bundles of spindle-shaped cells, arranged, according to Henle, in three layers, the outer and inner ones being longitudinal, and the middle one circular. The albuginea contains no Graafian follicles. The third layer—that is, the one next to the albuginea—is what Schrön has described as the cortical layer. This contains the smallest of the Graafian follicles arranged in groups, but separated by the stroma of the ovary, this latter being made up of bundles of spindle-shaped cells, some short and others long, each having an oval nucleus, and being probably young connective-tissue cells. The Graafian follicles of the cortical layer are spherical or slightly oval bodies, with a diameter of one one thousandth of an inch, and have as their external portion a delicate membrane—the membrana propria. Lining this is the membrana granulosa, a layer of flat, transparent epithelial cells, with oval nuclei. Within this, and occupying the entire cavity of the follicle, is a spherical cell—the ovum. The ovum is a collection of granular protoplasm containing a spherical or oval nucleus, the germinal vesicle, and this, in turn, a body known as the germinal spot. Below this cortical layer, imbedded in the stroma, are Graafian follicles of almost every conceivable size. While the older anatomists thought the total number of follicles in an ovary did not exceed twenty, this number being all that could be seen by the unaided eye, some of the more recent authorities have placed the number at six hundred thousand. As follicles rupture and discharge each month for a long series of years, the estimate of the earlier writers is undoubtedly too low—probably as much too low as that of some of the recent ones is too high. All the layers thus far described constitute the parenchyma of the ovary. Between this and the hilum is the vascular zone, which contains no follicles, but is made up of bundles of connective tissue and bundles of non-striped muscular tissue, which are directly continuous with the corresponding tissues of the broad ligament. It is in this vas-

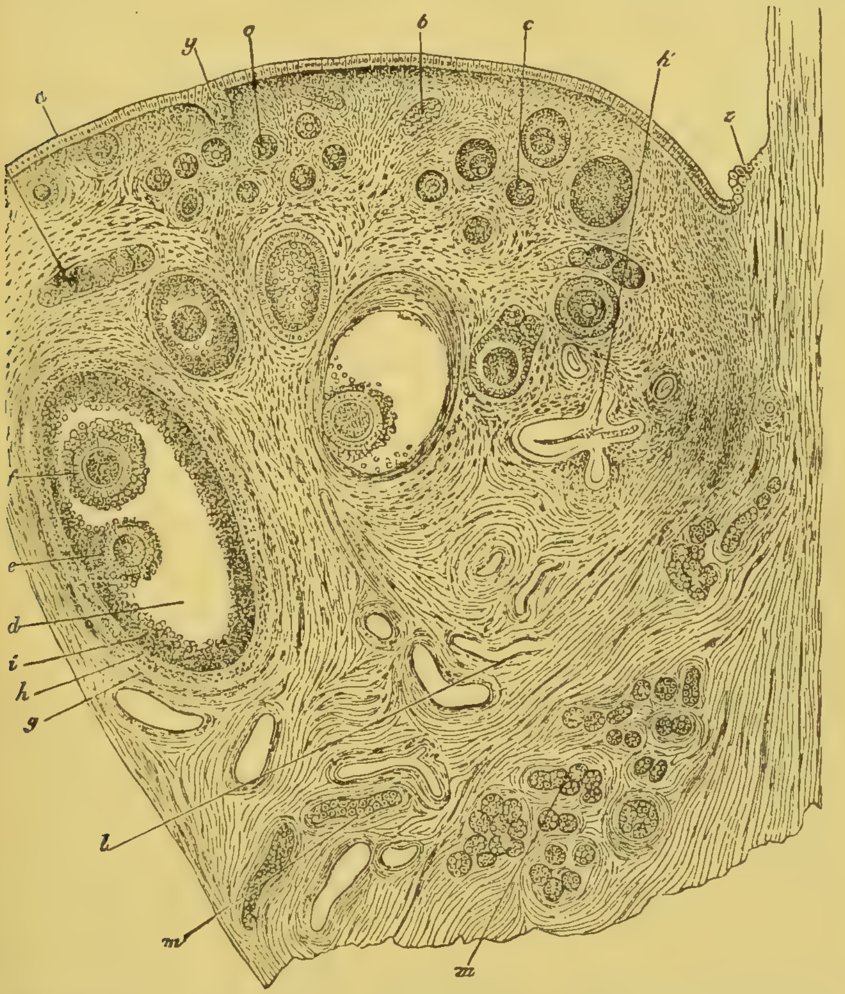

Fig. 212.—Section of the ovary of a bitch (Waldeyer). *a*, germ epithelium ; *d*, ovum ; *i*, membrana granulosa ; *f*, vitelline membrane, vitellus, germinal vesicle, and spot.

cular zone that the blood-vessels of the ovary are found, and, indeed, give to it the name which characterizes it.

The Graafian follicle of medium size is, like that of the cortical layer, made up of a membrana propria and a membrana granulosa, and contains an ovum. The ovum is, however, larger than that of the cortical follicles, and is limited by a thin membrane, the zona pellucida or vitelline membrane. This is believed to be formed by the cells of the membrana granulosa. As the follicle increases in size the ovum does not increase correspondingly, so that, while for a considerable time it completely filled the cavity, now it does not do so, and the space between it and the membrana granulosa contains an albuminous fluid—the liquor folliculi. It should be stated that a Graafian follicle, while it usually contains but one ovum, does sometimes contain two or even three ova. At one part of the membrana granulosa the cells are more abundant than elsewhere, forming a mound which is known as the discus or cumulus proligerus; in the center of this accumulation of cells the ovum is imbedded. Some of the Graafian follicles reach maturity, so far as can be told from their size and appearance, and undergo degeneration before the age of puberty is attained. Some of the small follicles also degenerate, never reaching maturity. The number of follicles which thus degenerate is by no means inconsiderable, and a knowledge of this fact, and that at each menstrual epoch a follicle ruptures, leads us to believe that the total number of follicles in an ovary must be reckoned by thousands.

Development of the Graafian Follicles and Ova.—Having described the minute anatomy of the ovary, we are now prepared to consider the manner in which the follicles and their contained ova are formed. The germ epithelium, which forms the superficial layer of the fetal ovary, undergoes rapid multiplication, as a result of which the cells grow in a direction toward the vascular stroma of the ovary; this likewise increases, and in a direction toward the germ epithelium. The stroma, developing between these masses of cells, which are offshoots from the germ epithelium, thus isolates them, forming islands or nests. These nests are larger below than above where they are for a considerable time still connected with the superficial germ epithelium. Indeed, at birth this connection exists and forms what Pflüger has denominated the ovarial tubes. The cells composing these nests multiply themselves by the process of karyokinesis, thus increasing the size of the nests, and forming new ones by being constricted off from the old ones. Some of the cells of the germ epithelium undergo special development in the cell-body and nucleus, and become ova, which are spoken of as primitive ova. The germinal vesicle is formed before the vitellus or the zona pellucida; but whether the formation of the germinal spot precedes that of the germinal vesicle has not been fully decided in the vertebrates. Kölliker finds this to be the order in the development of the ova of intestinal worms. As the multiplication of the cells of the germ epithelium goes on as already described, there is also a continually increasing differentiation of these cells forming the primitive ova. This production of ova takes place in the nests as well as in the superficial layer, and, as a result, we have each nest containing a number of ova, and ova are also found in the same manner in the ovarian tubes. The membrana granulosa is formed of the cells of the nests and tubes which do not take part in the formation of the ova. If a nest or an ovarial tube contains several ova, each ovum will form a center, around which will be aggregated a layer of cells, forming a membrana granulosa, and by the ingrowth of the stroma between these collections the Graafian follicles are formed. External to the membrana granulosa is formed the membrana propria, and still more externally the fibrous capsule or theca folliculi. As already stated, two or even three ova may become enveloped in a single layer of cells, and thus a single Graafian follicle be formed containing two or three ova. The ova and the membrana granulosa are consequently formed from the germ epithelium, which, as has been seen, consist of cells from the mesoblast. The membrana propria, the theca folliculi, the stroma, and the vessels are produced from the fetal stroma, which was also originally an outgrowth of the mesoblast. Some excellent authorities, among whom may be mentioned Pflüger and Kölliker, believe that Graafian follicles and ova are produced after birth; others equally reliable, as Bischoff and Waldeyer, deny this.

Ovulation.—The function of the ovaries is primary in the process of reproduction. Their physiological activity precedes the uterine functions, and continues, as a rule, until the menopause, and possibly after it. Hence the functions of the other sexual organs appear to be responsive to the influence of the ovaries.

There are, however, differences of opinion concerning this matter. Observations have been made which show that ovulation and menstruation occur independently of each other, in exceptional cases at least, and a high degree of importance has been given to that apparently independent action; but such irregularities are the exception, not the rule. There are facts in abundance to prove that, when the ovaries are absent or rudimentary from birth, the function of the uterus is never established, and the removal of the ovaries after puberty arrests menstruation in the majority of cases. All that we know regarding the influence of the ovaries upon development of the individual, and the exercise of the sexual functions throughout the reproductive period of life, points to the conclusion that these organs are the prime movers and controlling agencies, to speak figuratively, in the sexual system. The simple facts that ovulation and menstruation do not follow each other in consecutive order in exceptional cases, and that the two functions are occasionally performed independently of each other, do not affect the general rule in physiology. Because irregularities occur in the harmonious action of the sexual organs, their independence need not be doubted. The same natural order of phenomena is observed in all processes of the human economy. The primary action of an organ that stands at the head of a system sets all the subordinate organs in functional motion. Taking food is the first step in the great process of nutrition, and digestion and assimilation follow in natural physiological order. There are occasional irregularities in the succession of the processes of nutrition, as when gastric juice is secreted in the absence of food in the stomach; but such events are exceptions to the rule. Certain impressions made upon the brain are followed by definite mental phenomena, but the brain sometimes fails to respond to impressions; and, again, it occasionally acts independently of extrinsic excitants. So, also, an action or function which has been begun by a given influence may continue after the cause which produced it has been removed. If we accept the idea that the ovaries are essential to the very existence of the sexual system, and that their office is the highest and the first in the order of events which collectively make the complete process of production, it is easy to understand that their absence would arrest the action of the whole system. They are paramount, not subordinate, in reproduction, and in the maintenance of the relationship between the general and the sexual systems the ovaries are undoubtedly the most potential agents. The uterus and vagina are superadded structures, rendered necessary by a more complex and perfect system of reproduction in the higher species. The anatomical and physiological value of the ovaries as factors in the reproductive system suggests an equal distinction in their association with the general system, and in their influence upon it. This correlation has been variously estimated by authors.

Dr. Henry Maudsley, in his book entitled "Body and Mind," says: "The organic system has most certainly an essential part in the constitution and the functions of the mind. In the great mental revolution, caused by the development of the sexual system at puberty, we have the most striking example of the intimate and essential sympathy between the brain as a mental organ and other organs of the body. The change of character at this period is not by any means limited to the appearance of the sexual feelings and their sympathetic ideas, but, when traced to its ultimate reach, will be found to extend to the highest feelings of mankind, social, moral, and even religious. In its lowest sphere, as a mere animal instinct, it is clear that the sexual appetite forces the most selfish person out of the little circle of self-feeling into a wider feeling of family sympathy and a rudimentary moral feeling. The consequence is that, when an individual is sexually mutilated at an early age, he is emasculated morally as well as physically. It has been affirmed by some philosophers that there is no essential difference between the mind of a woman and that of a man; and that, if a girl were subjected to the same education as a boy, she would resemble him in tastes, feelings, pursuits, and powers. To my mind, it would not be one whit more absurd to affirm that the antlers of the stag, the human beard, and the cock's comb are the effects of education, or that, by putting a girl to the same education as a boy, the female generative organs might be transformed into male organs. The physical and mental differences between the sexes intimate themselves very early in life, and declare themselves most distinctly at puberty; they are connected with the influence of the organs of generation."

This much being claimed by so high an authority for the influence of the sexual organs upon the development and function of the brain and nervous system, I may inquire how far the ovaries are responsible for such results. Virchow and others have stated that the ovaries give to woman all her characteristics of body and mind, and I accept the proposition without qualification, feeling sustained in doing so by the fact that, when the ovaries are absent or defective from birth, the characteristics of the female sex are never fully developed. The tendency in the development of those in whom the ovaries are congenitally absent is toward the masculine type of the race. I have seen two such cases, decidedly masculine in their physical and mental attributes, and there are many others recorded in our literature. There are some authors, however, who appear to stand in opposition to what is here claimed. In Dr. Goodell's paper presented to the Pennsylvania State Society, he says, that "The physical and psychological influence of the ovaries upon woman has been greatly overrated." And again he says, "In the popular mind a woman without ovaries is no woman." He then gives his own views which are that, "beyond the induction of sterility and the probable absence of menstruation, the deprivation of the ovaries after puberty does not change the character of the woman." Battey, Hegar, Wells, and Peaslee, are given as confirming this doctrine. The views held by these authors are based upon observations of mature women from whom the ovaries have been removed. This alone is not a trustworthy source of information, because the results obtained up to the present time appear to be quite variable. For example, Dr. T. G. Thomas had one patient who was passive in her sexual relations before her ovaries were removed, but became aggressive afterward. On the other hand, Dr. M. A. Pallen, in a paper read before the American Medical Association, in June last, related the history of a girl who was promptly and completely cured of "hystero-epilepsy" and an incontrollable desire for self-pollution by Battey's operation.

It is true, no doubt, that an individual who has been fully developed under the influence of the ovaries, will continue to manifest her former attributes of body and mind after these organs are removed, but it does not therefore follow that the ovaries were negative in the process of developing and maintaining those attributes. One who has become blind in middle life will talk familiarly and understandingly of objects impressed upon the mind through the sense of sight, but one born blind can not comprehend the beauties of a landscape. This abundantly proves that mental peculiarities may continue after the physical influences which caused them have been removed. Observations made from the opposite standpoint give evidence which leads to the same conclusions. We find that, if the ovaries are present in a given individual, she will manifest the physical and psychical peculiarities of womanhood, although all the other sexual organs may be absent. Women, well developed in all that is peculiar to the sex, have been observed in whom the uterus and vagina were defective, but I have neither seen nor heard of any such perfection of organization occurring when the ovaries were absent. Perhaps the strongest argument on this point is the fact that other parts of the general system, when modified by the influence of the ovaries, are rendered capable of performing the major functions of the uterus, as is illustrated in a very striking manner by vicarious menstruation and abdominal gestation.

In this connection, a brief reference may be made to the influence of the nervous system in controlling the functions of reproduction. The full discussion of this question involves problems in physiology which have not been solved, and are therefore beyond the scope of this work. Whether the higher nerve-centers are developed to serve the demands of the nutritive and reproductive organizations, and whether the location of the nerve-centers which preside over sexual phenomena is in the cerebellum or the lumbo-sacral portion of the spinal cord, are questions which I am not at present able to answer. It is sufficient for the present purpose to keep in mind that the sexual organs are dependent upon the general nutritive system for organic support, and that they stimulate, depress, or modify nutrition through the ganglionic nerves chiefly, and that the portion of the brain which presides over the organic functions also dominates the reproductive organs. We should also recognize the fact that the emotions are in part dependent upon the sexual organs for their development, and on the other hand that the sexual organs are largely affected by the emotions. Metaphysicians agree in stating that the sexual appetence, which owes its existence almost entirely to the ovaries, leads to more emotions than any other human tendency, and clinical observations afford good evidence to the physician, that the emotions affect the functions of the sexual organs in a marked degree. Grief, fear, anger, and even great joy are capable of arresting menstruation and probably ovulation also. In view of this great potentiality of the ovaries in developing certain capabilities of the brain and nervous system and in influencing their functions, it is evident that, in order to maintain harmonious action of the whole organization, it is necessary that the ovaries shall exist in full development and functional activity. On the other hand, these organs which are essential to the well-being of the individual must, when diseased, exercise a potent influence in deranging the brain and nervous system.

From a somewhat extended consideration of this subject, I am satisfied that a great many affections of the brain and nervous system are due to disease of the ovaries. The remote effects of ovarian disease have been observed and recorded to some extent, but not so fully, I presume, as they might be. The tendency of observers has been to attribute certain mental derangements and diseases of the nervous system to the sexual organs in general or the uterus especially. A little attention to some of the known defects and diseases of the ovaries and their relations to diseases of the brain and nervous system will, I think, materially change that phase of the subject.

Imperfect development of the ovaries not only modifies the physical peculiarities of the individual, but also retards the development of the higher nerve-centers. The demands of the sexual organs (especially the ovaries) stimulate the brain to a higher development. A very large part of the brain and nerve power is devoted to reproduction, and if that function is never established because of the absence of the ovaries, the brain and nervous system are never fully developed. When a woman is deprived of the sexual organs the nutritive system may possibly attain a normal development, but the nervous system does not—it remains upon a lower plane. There is usually mental weakness and often derangement of mind among those in whom the ovaries are imperfectly developed. Among sixteen young single women, that came under my observation in the Insane Asylum, I found twelve who had imperfectly developed sexual organs. Some of them had never menstruated at all, and others had done so imperfectly. The history of these cases led to the conclusion that the defective development of the ovaries was an important element in causing insanity. They no doubt inherited an insane neurosis or diathesis, but the absence of ovarian influence, which favors a higher and more complete development of the nerve-centers, acted as the major-cause in producing the insanity. This is not claimed to be a positively correct deduction, but there is certainly strong presumptive evidence that such was the case. The mental derangement appeared in the majority of them at or about the period of puberty. There was nothing in the size or development of these patients to indicate any marked defect in the nutritive system. The nervous and sexual system alone were deficient. They appeared to have passed through girlhood in a normal way (although not manifesting a high order of mental capacity) until the period when the sexual organs should have begun to exercise their influence in completing the higher development of the nerve-centers. When that failed to take place, the brain became deranged, instead of assuming new activities. Still it is possible that the imperfectly developed sexual organs resulted from inferior general organizations which were from the beginning of a low type, and that the insanity which followed was due to transmitted lesions, and was not dependent upon the sexual organs at all. However, the facts appear to favor the opposite conclusion. One thing is certain regarding this subject: there is enough in the nature of the cases mentioned to invite further investigation in order to settle, as far as possible, the relation of the ovaries to insanity and other diseases of the nervous system which occur at puberty.

As the period of puberty approaches a considerable number of Graafian follicles (from twelve to thirty) enlarge, the largest reaching a diameter of half an inch. In the early stage of development, it will be remembered, the smallest follicles were found in the cortical layer, those of medium size in the middle layer, and still deeper, the larger follicles. These follicles increase in size by the production of an increased amount of liquor folliculi. This so distends the wall of the follicle as to cause it to project from the surface of the ovary, and to become thinner and thinner until finally it bursts, discharging the ovum with some of the cells of the membrana granulosa, especially those forming the cumulus proligerus. The ovum passes into the Fallopian tube, and through it descends to the uterus. This ripening and discharge of ova is the process of ovulation and occurs periodically, in the human female about every four weeks. As the time approaches in each month for the rupture of a follicle there is an abundant formation of vascular loops in connection with increased growth of the membrana propria, which together with the liquor folliculi distends the wall of the follicle. This distention stimulates the ovarian nerves, and as a result there is an increased flow of blood to the ovaries and other organs of generation. The wall of the follicle, in addition to being distended, also becomes fatty at its most projecting part, and when it is no longer able to withstand the internal pressure it bursts and the ovum is discharged. When this rupture takes place there is in the human female hæmorrhage from the vessels already spoken of as being found in the interior of the follicle. The amount of blood effused is sufficient to fill the cavity of the follicle. It soon coagulates, the serum is reabsorbed, the hæmoglobin becomes hæmatoidin, and after a time the coloring-matter disappears. In short, the same changes, take place in the blood here as when a hæmorrhage occurs elsewhere in a closed cavity. The wall of the follicle becomes hypertrophied and convoluted, and later on undergoes fatty degeneration, with the formation of lutein, giving to the structure a yellow color, on which account it has been called a corpus luteum. The corpus luteum spurium by which name the corpus luteum of menstruation is known, reaches its maximum of development at the end of the third week after menstruation, at which time it commences to diminish in size until at the end of the eighth week it is reduced to an insignificant yellowish cicatrix about one fourth of an inch in diameter, but it sometimes may be discovered if carefully sought at the end of eight months. If, however, the ovum which escaped from a given Graafian follicle becomes impregnated, then the process becomes modified in that follicle. The corpus luteum is then denominated verum instead of spurium. The differences between the two varieties of corpora lutea are of degree not of kind. The changes which take place are the same in both up to the end of the third week, then, instead of diminishing, the corpus luteum verum continues to grow until the end of the fourth month when it reaches the height of its development. It retains this maximum until the beginning of the seventh month when it commences to diminish, but may sometimes still be discovered nine months after delivery. The history of the corpus luteum is admirably described by Dalton to whose work on human physiology the reader is referred for a detailed account of its formation, and the subsequent changes which it undergoes.

LESIONS OF FORMATION OF THE OVARIES.

Both ovaries may be entirely absent, or, perhaps, it would be more correct to say, entirely rudimentary, or one may exist alone, or there may be a third one present. When a single ovary is absent the condition of uterus unicornis usually exists, although this malformation of the uterus is not necessarily accompanied by an absence of either ovary.

The absence of an ovary may be accounted for in different ways; it may not have been developed, it may have been properly formed, and by some dislocation of the uterus have had its circulation and nutrition so interfered with as to have caused it to shrivel and become absorbed, or it may have become attached to some other abdominal organ, and then its absence be only apparent and not real.

Several cases are on record in which a third ovary has been found. The most interesting of these is one which is described and figured by Winckel in his work on "Diseases of Women." In most of the instances the supernumerary ovary was found near one or the other of the normal ovaries, and either behind or in the broad ligament. In Winckel's case it was situated in front of the uterus and connected with the posterior wall of the bladder.

As Winckel has so well pointed out, these cases of supernumerary ovaries are always to be borne in mind in making a diagnosis. A cyst forming in the third ovary as found in his case might be detected between the bladder and the uterus, and be mistaken for some other form of tumor. In such cases also the removal of two ovaries may not prevent conception, the third ovary being in all respects normal, and consequently able to discharge ova. So also even after two ovaries are removed, should a third exist a cystoma may form, which will require operative interference.

CHAPTER XXVI.

DISEASES OF THE OVARIES. (CONTINUED.)

HYPERÆMIA, ACUTE AND CHRONIC OVARITIS AND PROLAPSUS OF THE OVARIES.

Inflammation of the Ovaries.—There are two forms of inflammation of the ovaries, the acute and the chronic. These are very distinctly different so far as their clinical history is concerned. There is another affection closely allied to these which is described by some writers as hyperæmia. All these are, however, but different degrees of the same affection, though each follows a different course and gives a history peculiar to itself. This latter fact justifies the consideration of the acute and chronic forms, at least, of ovaritis as separate affections. The third form, hyperæmia, is not so fully understood nor does it stand out so distinctly from the chronic form as to make its description easy.

Ovarian Hyperæmia.—While many of the characteristics of ovarian hyperæmia are like those of ovaritis, there is very good reason based upon clinical evidence, to believe that the two are different both in pathology and clinical history.

Ovarian hyperæmia, as it is generally observed, resembles many of the so-called functional diseases of the ovary, in that there is derangement of function, with symptoms of organic disease which usually disappear, leaving no evidence that there has ever been any change of structure or any products of inflammation. All this demonstrates that the pathology is, as the name implies, a derangement of circulation in which there is congestion, and the consequent derangement of function with the accompanying or resulting pain and suffering. The hyperæmia usually affects both ovaries, and, as a rule, extends to the other pelvic organs, after a time, at least. The derangement of function also extends to the uterus giving rise to derangement of menstruation. In fact, the congestion and functional derangements of the uterus are secondary to the ovarian hyperæmia. There is much in regard to pathology of this affection which is inferred from the symptoms, and can not be demonstrated by post-mortem investigation. The congestion may be of long or of short duration, its continuance depending upon the persistence of the causes which give rise to it. If it is well-marked and long-continued, it tends to chronic ovaritis, and, perhaps, to degeneration of the ovaries and premature atrophy. Should the causes which produce the congestion continue active and no treatment be employed, the affection may continue indefinitely. The general health becomes undermined by the derangement of the menstrual function and the exhaustion of the nervous system; and if the patient is not relieved by treatment or by improved hygienic conditions, she continues a sufferer until the menopause.

With so little that is definite regarding the pathology, one might well ask if the fact is yet established that there is a distinct affection to be known as ovarian hyperæmia. In answer to this, it can only be said that the clinical history clearly points to this derangement of the circulation as the only rational explanation of the phenomena presented in these cases. It should be stated here that there necessarily must be present in this affection a derangement of ovarian innervation as well as hyperæmia. In fact, it appears that this derangement is the starting-point in the morbid condition. This view of the matter is favored by the affection depending for its origin upon perversion of the emotions in those of nervous temperament.

Symptomatology.—Hyperæmia of the ovaries occurs most frequently among those who are unmarried, or among young widows who have never had children.

It does not come on abruptly like an attack of acute ovaritis, as a rule, though it occasionally does so, but is developed rather gradually. Those most liable to this affection are the nervous and emotional who live in conditions of life favoring excitation without complete functional action of the sexual organs. I have never seen a case of this kind among those who lived under wholesome conditions of life or who were married, bearing and nursing children, and who lived quiet, rational lives. At the beginning there are pain and heaviness in the region of the ovaries, usually accompanied by much nervous disturbance of the nature of irritability and weakness, the patient being easily excited and as easily fatigued. Soon after the appearance of these symptoms the menstrual function becomes deranged. There is usually menorrhagia, which is preceded by increase of the ovarian pain. Sometimes the pain is relieved and the patient feels much better during the menstrual flow, and for a time after it ceases. In some cases the first symptom developed is derangement of the menstrual function, generally too frequent, and too free menstruation. In a word, menorrhagia is the most prominent symptom of ovarian hyperæmia. The free flow being due originally to the ovarian excitation is conservative at first, I believe, relieving the congestion which produced it. I have frequently seen young women, who apparently suffered from ovarian congestion, recover completely after one or more free attacks of menorrhagia. When the excessive menstruation does not relieve the congestion, which it certainly will not do if the causes which produced it are continued, then it leads to anæmia and neurasthenia, and this state of health may continue indefinitely.

There are other symptoms which may be mentioned, as backache and general pelvic tenesmus, increased on walking sometimes, but not always. In the less severe forms of hyperæmia of not very long standing, active muscular exercise gives relief not for the time only, but is oftentimes permanently beneficial. There is often irritability of the bladder, which is purely nervous.

Physical Signs.—There is tenderness on deep pressure made in the iliac regions, not acute, but of that dull character which is peculiar to the ovaries. As the disease affects both ovaries, as a rule, there is tenderness alike on both sides.

Bimanual examination usually shows tenderness better than abdominal pressure, but I have found that in these cases it is very difficult to grasp the ovaries between the two hands, owing to the fact that the abdominal muscles are tense; while in the majority of cases there is tenderness if pressure is made upon the ovaries, either through the vaginal or abdominal walls, I have seen many cases in which steady but not too heavy pressure in the iliac regions gave relief. Perhaps these were cases of the kind that Charcot calls hystero-epilepsy, in which the convulsions are relieved by pressure upon the ovaries. I have seen some of Charcot's cases, and believe them to be ovarian hyperæmia.

The physical signs obtained are rather negative, but by excluding the evidence of other ovarian affections, and taking the history into account a presumptive diagnosis can be made, and the diagnosis will be confirmed by the subsequent history. Under treatment and improved moral and physical hygiene, recovery will take place much more promptly and completely than in chronic inflammation.

In connection with this affection of the ovaries, especially if it has existed for several months, there is usually congestion of the uterus and vagina which yields promptly to treatment.

Prognosis.—The great majority of patients recover under appropriate treatment. In fact, many of them recover after the causes are removed without any treatment whatever. This will be seen in the history of the cases given further on.

Causation.—Overstimulation of the emotions in those of a nervous temperament is one of the chief causes of ovarian congestion. This is operative among those who are not usefully employed, but are permitted or even encouraged to turn their attention to the procreative function while they are still undergoing development. Stimulating tonics which create an appetite which is not satisfied with food will cause gastric congestion, and all the consequences which arise therefrom. In like manner stimulating the sexual appetence of unoccupied emotional young girls by evil influences or improper associations leads to ovarian congestion. Those who have lived in the proper exercise of the sexual function, but have been abruptly cut off from normal gratification, are prone to ovarian congestion. Indulgence beyond normal gratification is also said to have produced the same result. All these causes are, to a great extent, psychical, but ovarian congestion may be produced by purely physical causes. It may be secondary to endometritis, sedentary habits, and constipation, which may interrupt the free circulation in the pelvic organs.

It is rare, however, that cases of ovarian congestion can be traced to such causes.

Treatment.—The removal of the cause, when that can be accomplished, is, as I have already said, often sufficient to give relief. The termination of an engagement in marriage has cured the menorrhagia in many cases, and complete recovery has followed when pregnancy occurred.

A like benefit has been brought about in younger patients by directing the attention to something other than self and the feelings and emotions. A change from books and society to the woods and fields, and outdoor occupation in the way of amusements should be employed. Bathing is useful—either sea-bathing or the shower-bath—if the patient is strong enough to bear it. Tonics to restore the general strength, nux-vomica being the most efficient; counter-irritants, ergot and bromides complete the list of therapeutic agents.

The tonic and ergot should be given through the day, and the bromide at night to secure rest and sleep.

Acute Ovaritis.—This is quite distinct from other ovarian affections, because it is probably always the result of some special cause —usually a specific poison, such as gonorrhœal infection, puerperal septicæmia, or some constitutional condition like that which exists in the eruptive fevers and in acute rheumatism. It may also be traumatic, though that is rare, except when the ovaries become involved in a general pelvic inflammation due to an injury. There has been and still is much confusion of thought regarding the pathology of ovaritis. Some of the conflicting accounts arise, I presume, from confounding acute and chronic ovaritis and ovarian hyperæmia. There is, no doubt, so marked a resemblance between these three affections, and they are so often associated that it is impossible to differentiate them in many instances. Still, between the typical causes of each, met occasionally in practice, the distinction can be easily made. The acute affection runs its course rapidly, and terminates either in death or a subsidence of the acute inflammatory symptoms and a damaged state of the ovaries. There are well-defined symptomatic forms, and the changes of structure which result in connection with the clinical history are such as belong to acute inflammatory action. In chronic ovaritis there are, on the contrary, changes which take place much more slowly, and are not marked by the same definite products of inflammation. In congestion of the ovaries there are no tissue changes. It appears to me that acute and chronic ovaritis are as well defined, both in clinical history and anatomical changes, as acute and chronic nephritis. There is still much need of more observation and careful comparisons of the clinical history and post-mortem appearances in order to settle more definitely the pathology of acute ovaritis.

Pathology.—When ovaritis occurs in connection with the puerperal state, only one ovary is affected as a rule. All the tissues of the ovary take part in the congestion, which is the first morbid change produced. Following the congestion there is swelling from the transudation of serum, which is often of a reddish color. The inflammation involves all the tissues; the vesicles, stroma, parenchyma, and the envelope, and not infrequently the fimbriated extremity of the Fallopian tube is involved, and the peritonæum around the ovary. Then the ovary becomes surrounded with the exudate, so that from the gross appearances it is not possible to tell whether the ovary or the peritonæum was first attacked. The changes in the ovary are, in addition to general serous effusion, destruction of the vesicles from effusion or purulent infiltration; sometimes one large abscess is formed in the ovary which destroys most of the tissues; in other cases a number of small abscesses are found. In short, acute ovaritis is general as a rule, but occasionally partial ovaritis occurs. From what has been said, it will appear that ovarian inflammation is, in its morbid anatomy, similar to adenitis generally. The congestion, serous effusion, suppuration, the formation of single or multiple abscess, and plastic exudations on the free surface of the ovary are the usual changes. These changes are manifested in different degrees at various parts of the ovary, due in part to the course which the disease follows, but more especially to the different structures or elements which compose the ovary. In addition to these pathological changes, there are others which may or may not occur. There are prolapsus of the ovary and adhesions to neighboring organs. The abscess may open into the rectum or the peritoneal cavity, or find its way into the lymphatics or veins, which are often dilated; quite frequently the abscess does not discharge at all, but remains encysted.

Symptomatology.—There are both local and constitutional symptoms in acute ovaritis. There may be a chill or rigor, followed by fever, nausea, vomiting, and pain more or less acute. The acuteness of the pain appears to be greatest when the peritonæum is affected. There is marked disturbance of the nervous system, shown by irritability and anxiety, but no delirium; not infrequently, however, hysteria and, in a few cases, mania have been developed.

The only difference which I have noticed between the symptomatic form of ovaritis and other acute pelvic inflammation is that in the former the nervous symptoms are more marked. In mild forms of this affection the constitutional disturbances are less severe; still there is an elevation in the temperature, increased frequency of the pulse, and deranged primary nutrition. The appetite is poor, and there are dyspepsia, flatulence, and constipation. The symptomatic form subsides to some extent after the first few days, and the formation of pus reawakens the general disturbances. There may be a chill, followed by perspiration, or irregular rigors may occur, and the pain may return more acutely. The local symptom is pain, which is often circumscribed, the patient being able to point out the exact spot in the iliac fossa where the pain starts, and from which it radiates, and where the tenderness is felt on pressure. There are pelvic tenesmus, and a frequent desire to urinate, and, if the left ovary is the one affected, there is often excruciating pain during defecation.

Physical Signs.—There is acute tenderness on pressure, more definitely located than in pelvic peritonitis. Sometimes the ovary can be felt through the abdominal walls. This is frequently the case when the ovary is greatly enlarged by the products of the inflammation, and is fixed high up by adhesions. By the vaginal touch heat and tenderness are detected. Pressure causes pain of a character peculiar to the ovary. The finger should be carried high up behind the uterus, when the ovary may be caught between it and the sacrum. By very gentle manipulation the uterus and the ovary also, perhaps, are found to be movable to a limited degree. The location of the tumor, its partial mobility, its form, and that it is not connected directly to the uterus, all go to aid in making the diagnosis. The rectal touch will enable the examiner to locate it.

Differentiation.—Owing to the fact that, in the present state of science regarding this affection, the diagnosis is not at all times easy to make, it is necessary to mention the conditions which resemble it, and point out the differences which help to define and distinguish acute ovaritis from them. Acute ovaritis is easily distinguished from chronic ovaritis and hyperæmia by the absence in the latter of symptomatic fever. Much aid is obtained by the history which nearly always presents some of the causes which give rise to acute ovaritis.

It may be distinguished from pelvic peritonitis and cellulitis by the physical signs. The fixation of the uterus and the more diffuse distribution of the inflammatory products being most marked in the cellular and peritoneal inflammation. In cases of acute ovaritis that are complicated with cellulitis or peritonitis, the differential diagnosis can not be made upon the living subject. That these affections have occurred together can be determined, but which was the primary affection can only be surmised from the history.

Prognosis.—When suppuration occurs, and the abscess opens into the peritoneal cavity, a fatal termination should be expected. Death may also occur from septicæmia when the contents of the sac of the abscess find their way into the lymphatics or veins. This, I believe, is more likely to occur when there are a number of small abscesses with thin walls. If the accumulated pus is discharged through the rectum or vagina, or if the abscess becomes encysted, recovery may take place. The ovary is, of course, damaged or destroyed, but, if one ovary is left in a normal state, the patient may regain health and bear children. In some cases of chronic suppuration, in cases where the pus is discharged through the rectum or vagina, or is walled in by peritoneal adhesions from plastic exudation, relief may be obtained by surgical means to be referred to when discussing the treatment.

Causation.—The causes of acute ovaritis have already been named.

Puerperal septic absorption and gonorrhœal infection are the chief causes. Lawson Tait has called attention to the eruptive fevers and acute rheumatism as giving rise to acute ovaritis, and my own observations agree with his in the main.

While I have not seen ovaritis occurring in connection with rheumatism, I have seen several cases caused apparently by the eruptive fevers. I have never seen ovaritis due to traumatic causes, still I can believe that such might be the case.

Treatment.—In regard to the management of acute ovaritis, I may say, in brief, that the cases that have come under my care have been treated exactly as I have treated pelvic peritonitis or cellulitis. I have not discovered any special line of management as specific medication; hence, to avoid useless repetition, I must refer the reader to the treatment of the above-named affections. I may remark in passing that, knowing that the causes are specific in the majority of cases, care may be taken to prevent the occurrence of ovaritis by judicious treatment of the affections which give rise to it. There is room for doubt, however, if much can be accomplished in this way.

Chronic Ovaritis.—*Pathology.*—The study of the pathology of ovaritis derives a special interest from the fact that the ovary differs from all other organs of the body, in that its function is performed at the expense of a portion of its structure which is never restored to its original condition. The rupture of each Graafian vesicle in ovulation causes the destruction of the vesicle. Rudimentary vesicles mature and repeat the function of their predecessors, and are in turn destroyed. Finally, the supply ceases, and the ovary, worn out in structure, becomes functionally incompetent long before the general organization has reached the end of its life and activity. In all other organs of the body function is effected through cellular disintegration and restoration.

This peculiarity in the natural history of the ovary makes it difficult for the superficial observer to distinguish between the normal degeneration and the structural changes which result from chronic ovaritis. Experts also find it no easy matter to distinguish, by gross appearances, the atrophy of old age from the cirrhosis of inflammation.

The pathology of ovaritis is characterized by changes of structure brought about chiefly by areolar hyperplasia first, then by atrophy of the normal tissues, and finally by a condition of cirrhosis.

In this respect the morbid process and its products more resemble degeneration than inflammation such as is observed in other organs. In the natural history of its pathology chronic ovaritis is more like certain forms of chronic nephritis. Owing to these peculiar and distinguishing features, the affection has little in common with acute puerperal or non-puerperal ovaritis, or with secondary acute ovaritis due to peritonitis, and therefore all such conditions will be carefully excluded from the discussion of the subject in hand.

The first variation from the normal toward the pathological is deranged innervation; the ovary, owing to its important office and intimate relations to the other organs, being peculiarly prone to reflex disturbances. These, though temporary as a rule, when oft repeated and prolonged in duration, induce changes in the circulation which impair nutrition and finally produce changes of structure. This ovarian hyperæmia, the first step in the process, may subside, and complete recovery follow. Reliable evidence of this has been obtained, first by clinical observation of cases which have given all the signs and symptoms of ovarian congestion, and which, under careful management, have completely recovered.

Secondly, by inspection after laparotomy. I have not infrequently found a prolapsed, tender, and painful ovary, which upon inspection was markedly hyperæmic, but presented no apparent change of structure except œdema. After fixing it in place by stitching the utero-ovarian ligament to the upper border of the broad ligament, the signs and symptoms have all subsided. The continuation of the hyperæmia slowly produces those structural changes which are invariably effected by prolonged mal-nutrition. The first noticeable changes take place in the blood-vessels themselves. They become dilated, and a peculiar degeneration of their walls occurs. These changes have been elaborately studied by Dr. E. Noeggerath, who advanced the idea that these vascular changes were closely related to the genesis of ovarian cystomata. This may be true in certain cases, but it more frequently ends in areolar hyperplasia of the stroma, which gradually goes on, and in time crowds out all the normal structural elements of the ovary. Finally, a true cirrhosis is produced. With these changes in the blood-vessels the circulation is interrupted to a degree that causes œdema, which increases the size of the ovary and renders it softer. Apoplexies sometimes occur, and occasionally one or more of the blood-clots may be seen near the surface. These conditions can be distinguished from a diseased vesicle by the staining of the tissues around the clot. This last-mentioned lesion occurs in the early stage of the ovaritis, and gradually disappears as the process of hyperplasia proceeds to a complete cirrhosis. These changes explain some of the important facts in the clinical history. The ovary which is found enlarged, softened, and tender to the touch, will, in months afterward, appear subnormal in size. Likewise the same lesions may be recognized upon inspection after laparotomy, if one has become familiar with them by previous study.

While hyperplasia of the stroma is going on, the follicular elements undergo certain changes. The contents of the follicles become cloudy from degeneration of the epithelial elements. The gross appearance of the ovary at this time would lead one to suppose that there were a number of vesicles approaching maturity, but the uncommon number of these is evidence that they are abnormal.

The full value of a knowledge of the gross pathology of ovaritis can be fully estimated by those who have mistaken the normal for a pathological degeneration of the ovaries, and have removed them, to learn subsequently, through the microscopist, that they were not diseased. The morbid appearances which aid the surgeon in deciding when to remove an ovary and when not to remove it are as follows: The presence of follicles which, from their size, number, and dark color, are evidently diseased: enlargement, congestion, and softening from œdema, and patches of induration, with irregular distention of the vessels and the evidence of small blood-clots, as described above. Cirrhosis, indicated by subnormal size, induration, and irregular surface, when found in a young subject, can be easily passed upon. But in a subject near or after menopause this appearance of the ovary does not enable the surgeon to decide with certainty whether there is cirrhosis or simply senile atrophic degeneration.

Symptomatology.—The history of chronic ovaritis includes both local and constitutional symptoms. The constitutional derangements are not acute, but are usually marked by depression of the nutritive and nervous systems. The reflex derangement of the digestive organs is manifested by capricious appetite, nausea, and sometimes gastralgia. The bowels are usually constipated and tympanitic. There is often nervous debility attended with great emotional disturbance. I believe that I have seen more marked derangement of the brain and nervous system caused by chronic ovaritis than by the reflex influence of any other affection of the sexual organs. These constitutional symptoms are progressive, the patient's general health becoming more impaired month after month as the disease advances. The local manifestations are pain and derangement of menstruation. There is often menorrhagia; in fact, that is the rule, but in cases of long standing I have seen amenorrhœa. The ovarian pain is usually increased for several days before menstruation, and is relieved to some extent when the flow has lasted a day or two. The menstrual pain is much more severe and persistent if there be a uterine disease accompanying that of the ovaries. The ovarian pain varies according to the ovarian tissue affected. When the stroma alone is the site of the disease the pain is less severe. Much more suffering is experienced when there is circumscribed peritonitis or salpingitis.

All these symptoms are aggravated by standing, walking, riding, or sitting in a stooping position for any great length of time. Most comfort is obtained by the recumbent position. Sexual excitation and coitus cause so much suffering that the patient shrinks from both. There are exceptions to this rule, but not many.

Physical Signs.—The ovaries are tender to the touch, and the pain excited by pressure lasts for a long time as a rule. The character of the pain excited by the touch is described as ovarian. When the ovary is enlarged or changed in form it can sometimes be made out by the bimanual touch. The ovary is usually movable, and its separation from the uterus can be distinguished. It will be observed that the symptoms and physical signs of chronic ovaritis closely resemble those mentioned as occurring in ovarian hyperæmia. The fact is that the two affections have many features in common, hyperæmia being a part or the initial stage of inflammation, the manifestations of the two affections are similar.

Between ovaritis and ovarian neuralgia there is a close resemblance, but the differences are also equally marked. In neuralgia there is no evidence of inflammation, it is not continuous, and very often the ovary is not tender. The diagnosis can only be made by a due consideration of the history as related to the cause, duration, physical signs, symptoms, and progress of the affection.

Prognosis.—If the patient has the good fortune to be placed early under treatment, the chances of recovery are favorable. This is still more certain if only one ovary is affected. The disease may go on in one ovary to complete destruction of the organ by hyperplasia of its cellular tissue and atrophy of its glandular elements, and after this premature atrophy all suffering may subside except occasional neuralgic pain; and the other ovary may perform the ovarian function. In case the disease is complicated with inflammation of the neighboring peritonæum, and there is marked destruction of tissue from the inflammation, relief can only be given by removing the ovaries. There is not a great mortality from this affection. I have never seen a fatal case, but I have seen several in which life was not worth living.

Causation.—The causation of chronic ovaritis demands a brief notice, owing to its intimate relation to the question of treatment. According to my observations, the cause which most frequently obtains is imperfect menstruation. When the uterus is undersized or flexed forward or backward, and the menstrual flow is scanty and attended with pain, the ovaries are liable to take on chronic inflammation. This is far more liable to occur in this class of subjects if the sexual function is perverted. Specific causes such as produce the eruptive fevers are said to affect the ovaries, but I believe that acute ovaritis is more liable to occur under these circumstances. It is probably true, also, that gonorrhœa causes acute rather than chronic ovaritis.

The strumous diathesis (which I understand to be that condition of organization which invites tuberculosis) predisposes to chronic ovaritis, and inherited or acquired syphilis does likewise.

Much has been written about endometritis as a cause of ovaritis, upon the theory that the structure of the endometrium and that of the ovaries have a common embryonic genesis, and the fact that the two diseases are often found together, but this is still an open question.

Surgical Treatment.—The advancement of abdominal and pelvic surgery in recent times has led to the removal of the ovaries as the most prompt and effectual treatment of chronic ovaritis. There are reasons for this upon theoretical grounds. The ovary is causing much suffering; there is a likelihood that it will be a long and tedious trouble; especially is this the case if general treatment has failed; the ovaries are not necessary to existence, and can be removed with safety; it is according to the rules of surgery to remove any organ, or other portion of the body, that one can live without, in case a disease of the part tends to take life or cause unlimited suffering and invalidism; hence, from this way of looking at the matter, the ovaries should be removed.

The facts are (facts that have been proved almost sufficiently), that chronic ovaritis does not end fatally, and is self-limited though often of long duration; the removal of the ovaries is not free from all danger, though all cases properly operated upon have recovered, and it does not in all cases give complete relief. In fact, many of the cases are not much improved, if at all; even those who are nearing the menopause, and who bear the loss of the ovaries better than younger subjects, occasionally suffer much from those nervous disturbances which follow an abrupt menopause, and have to endure pelvic pain in the region of the stumps. The clinical history of cases in which the ovaries have been removed does not, in all cases, show great advantage over those in which the ovaries are left to complete the natural history of the disease.

Younger subjects do not bear the loss of their ovaries well. Some become fat, indolent, inefficient, and subject to headaches; others are irritable, dyspeptic, and despondent; while but few enjoy good general health and mental vigor.

This statement is at variance with much of the published literature, but is more in accordance with the actual facts. The cases cured are those operated on when near the menopause; those who are improved are generally those who suffered from complicating affections, such as dysmenorrhœa; while the unimproved are the younger subjects in whom the disease was uncomplicated.

The objections to surgical treatment apply to the removal of both ovaries. In cases in which one ovary alone is affected, and especially where there is prolapsus of the affected ovary and retro-displacement of the uterus, ovariotomy is perfectly satisfactory. The removal of the diseased ovary gives relief, and the retro-displaced uterus can be restored, while the remaining ovary performs its functions, and the general health of the patient is preserved. I desire to be understood as advocating the removal of the ovary only when there are structural changes from inflammation and prolapsus at the same time. Prolapsus can be relieved by fixing the ovary to the upper border of the broad ligament, and the welfare of the patient can be thus conserved to a higher degree. When advocating conservative measures in regard to abdominal and pelvic surgery it may be inferred that I am behind the age in experience, but I have had a large field for operative surgery, and have acted to the fullest extent justifiable, according to my judgment. In fact, I have in the past violated the rules I now advocate, but I have not been satisfied to have my patients simply survive the operations. I require that they be cured, and failures in this regard have led, I trust, to a rational conservatism.

I have no word of condemnation for those who have removed and are still removing ovaries for the relief of chronic ovaritis. Their work, while not always beneficial, has been of vast interest to science. Their doings help to perfect surgery. The rough, unsightly scaffoldings employed by builders are temporary necessities, which are all cleared away when the structure is perfected and completed. In like manner the heroic, daring experiments of the surgeon are valuable stepping-stones which lead to mature science and art.

General Treatment.—The indications for general treatment are to lessen the blood-supply and relieve pain by correcting the deranged innervation. This demands rest in the recumbent position in the early stages. At the same time general exercise should be enjoined, either by massage or gymnastic exercise in the reclining position. I specially desire to commend systematic calisthenics, in the recumbent position, as a most valuable aid in improving or maintaining the general health in many diseases of the pelvic organs which require rest as an important part of the treatment. The condition of the digestive organs should be carefully watched. The poor appetite, coated tongue, and constipation, or the capricious appetite, flatulence, and occasional diarrhœa, can be relieved by a number of small doses of mercury and a laxative. The saline laxatives are the best when they act without causing flatulence. The use of Saratoga waters often gives good results by improving digestion and keeping the portal circulation active. By keeping up a free elimination by the bowels and kidneys much benefit is obtained. This applies in cases that are apparently debilitated. Many times I have stopped the use of tonics, stimulants, and forced feeding, and given saline laxatives, with the effect of increasing the patients' strength. To relieve the pain and lessen the hyperæmia, the bromide of sodium and fluid extract of hydrastis canadensis are by far the most potential agents that I have found; they are given in combination, and in doses sufficient to produce the desired effect. Twenty to thirty grains of the bromide and ten to twenty minims of the hydrastis, three times a day, until the physiological effects of the bromide are noticed in a mild degree. If the hydrastis is given alone, in such doses, it sometimes causes pelvic pain of a dull character, but when combined with the bromide it has no such effect. These agents are most efficacious in the beginning of the attack, and hence they should be discontinued as soon as the pain is relieved in a marked degree. Should the pain and tenderness return at the succeeding menstrual periods, the bromide and hydrastis should be resumed. In some cases much larger doses of bromide are required, and in others it fails altogether to relieve pain. Then it is necessary to employ other agents, especially during menstruation. Ten-grain doses of salicylate of soda and five of antipyrin, given between meals and in the night, when the stomach is empty, answer for some; others, more especially those markedly debilitated, do better on full doses of aromatic spirits of ammonia, camphor, and chloric ether, with small doses of cannabis Indica This combination is best suited to those who get relief from gin or whisky, but it is to be preferred, as alcoholic stimulants ultimately do harm, though they may give temporary relief. Direct or local treatment should be adapted to the social state of the patient, and the presence or absence of complications, such as endometritis. In the unmarried, local treatment is often injurious. In fact, in such cases it is better to avoid any examination of the pelvic organs, if the history is sufficiently clear to enable one to make a diagnosis with reasonable certainty. Hot sitz-baths, counter-irritation, and hot vaginal douches, the latter to be employed by a competent nurse, comprise about all that I employ in the way of direct treatment The vaginal douche should not be continued unless it is decidedly sedative in its effects. Baths used according to the rules of modern hydrotherapy are of great service.

In weak, nervous patients I begin with the wet-pack, used for half an hour at a time. Those who require a sedative are put into water at a temperature of 95° F. for ten or twenty minutes and then dried by brisk rubbing. When the sedative effects of the bath are no longer needed, the tonic bath should be used. This consists of the cold sponge, shower, or plunge bath. The water should be warm at first, and gradually reduced in temperature at each bath.

In married women (and those who are so in all but the name) local treatment is more valuable. The treatment of any disease or displacement of the uterus that coexists should be managed in the usual way, and such local applications should be used as may aid in relieving the tender and hyperæmic ovaries. I employ a small tampon or pledget of cotton or wool saturated with equal parts of tincture of belladonna and glycerin, applied behind the cervix uteri and permitted to remain forty-eight hours, and after its removal a hot douche. These are continued during the first days of treatment. The effect is to support or steady the ovaries, while the sedative effect of the belladonna and the depleting effect of the glycerin are obtained. This I have followed with applications of tincture of iodine, after the manner of Dr. Emmet. Recently I have used, with good effect, the sulphichthyolate of ammonium, five parts in ninety-five of glycerin, applied in the same way as the belladonna and glycerin.

The general and local treatment thus briefly outlined gives relief from the more pronounced symptoms. The pain becomes less, and the tenderness also. The general health improves, and the pelvic congestion subsides. This is apparent in the color of the mucous membrane, the improvement of the menstrual functions, and the diminished leucorrhœa. Then the local treatment may be employed at longer intervals, or suspended altogether. The constitutional treatment should now be modified. Tonics and laxatives may still be required, but alteratives are also indicated. Iodine and mercury are the chief agents. They act upon the ovaries, as they do upon all glandular organs, and modify or arrest the morbid histological changes which take place slowly. Small doses of bichloride of mercury, with chloride of iron, when iron is indicated, followed by syrup of the iodide of iron in doses as large as can be borne. These can only be used when the bromides are relinquished. When giving these alteratives the patient often misses the bromides used to produce sleep. Sulphonal at such times is of great value. In fact, it is the most potent sedative that is at the same time free from ultimate or after effects that are unfavorable that we have in gynæcological practice. When a sedative is required while iodine or mercury is being used, I find that ten grains of salicylate of sodium and five grains of antipyrin, three times a day an hour before meals, give much relief, especially in those who suffer from nervous dyspepsia and flatulence.

Important elements in the treatment are patience and careful watching. Improvement comes, and the patient or the physician gives up treatment, and there is danger of relapse. The poor in hospitals often suffer for want of time for prolonged treatment, and this frequently tempts the surgeon to seek more prompt relief by removal of the ovaries. This does not apply with the same force to those who have time and means to secure the needed care.

The description of the operation for the removal of ovaries destroyed by inflammation, as well as that for the removal of diseased tubes, will be found at page 590.

Displacement of the Ovaries.—The ovaries have been found dislocated in a variety of ways. Cases are recorded in which the ovaries descended through the inguinal canal after the manner of the testicles. The most interesting of these is one reported by Percival Pott, who removed both ovaries that were found in the usual position of an inguinal hernia; and still another is mentioned by Tait, in which the ovary found its way outside of the inguinal ring and there developed a cystic tumor, which was removed by a Spanish surgeon. The ovaries have been found dislocated laterally and high up in the pelvis. They are, in such cases, usually fixed in the malposition by adhesions.

Prolapsus of the Ovaries.—Downward dislocation of the ovaries is quite a common affection compared with all the other displacements. It is the only affection of this class which has an interest to the gynecologist derived from the frequency of its occurrence and the great suffering to which it gives rise. On that account it deserves more than a passing notice, such as I have given to the other forms of displacement of the ovaries.

Prolapsus of the ovaries I have described as occurring in two degrees—complete and incomplete. This classification is based upon the fact that displacements of the ovaries must in practice have the natural division. In the incomplete form the ovary has simply descended from its normal position until it has reached the side of the sac of Douglas or the utero-sacral ligament, where it lodges. In the complete form the ovary rests in the most dependent portion of the sac of Douglas. Fig. 213 shows the position of the ovary in complete and incomplete prolapsus, and the relation of the prolapsed organ in relation to the uterus and sac of Douglas. The figure also shows what is sometimes found in practice—namely, complete prolapsus of one ovary and incomplete prolapsus of the other occurring in the same subject. While prolapsus of both ovaries in differing degrees, or both in the same degree, may occur, I more frequently find one displaced, while the other is in its normal position.

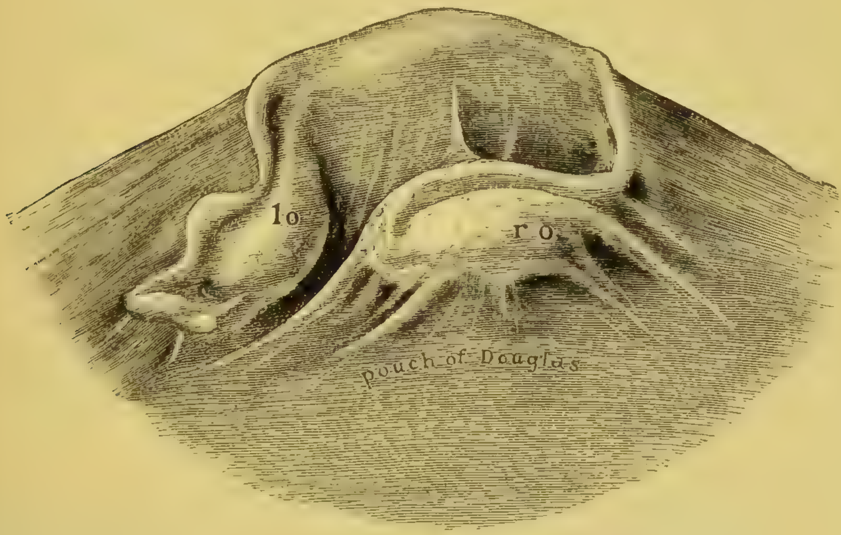

Fig. 213.—Ovary displaced and bound down in the *cul de sac* by adhesions. *ro*, right ovary; *lo*, left ovary.

The left is the one most frequently displaced, or else it causes the most suffering, and on that account attracts more attention than the right, and is oftener discovered.

Prolapsus necessitates a stretching of the supports of the ovary, or it may be an elongation from an increase of tissue, the result of hyperplasia or new development. Prolapsus does occur without complications or coexisting affections, which cause the displacement. Such cases are not very common, and they are probably the result of arrest of development. In many cases, perhaps the majority, there is some accompanying affection which has some part in the causation of the prolapsus. The ovary itself is often enlarged from inflammation or some degenerative changes. In other cases the supports of the ovary are elongated from imperfect involution after confinement. Retroversion of the uterus is also frequently associated with prolapsus of the ovary. A not uncommon and a very unfortunate complication is the formation of adhesions from peritoneal inflammation.

Symptomatology.—The degree of suffering arising from dislocation of the ovaries is extremely varying in different cases. This is due largely to the fact that, if the ovaries are quite normal and simply displaced, but little inconvenience is experienced by the patient. It is rare to find this state of things, because the ovaries are often diseased, or else displacement soon leads to congestion, tenderness, and pain. As a rule, then, in displacement of the ovaries there is pelvic tenesmus and pain on walking or standing, relief from which is obtained by the recumbent position. In this the history differs from inflammation of the ovaries. There is usually backache and pain along the thighs, and pain and tenderness during and after sexual intercourse. There is pain after defecation, especially when the left ovary is displaced, which is most frequently the case. This pain is peculiar and, I believe, diagnostic. It comes on during or immediately after the action of the bowels, and continues for an hour or two. It is a dull, aching pain located in the region of the ovary, and radiates to the abdomen. It produces in many cases faintness and nausea, compelling the patient to lie down until it subsides. It is easily distinguished from the acute, smarting pain due to hæmorrhoids or fissure of the anus, on account of its location and character. There is in some cases derangement of menstruation, usually menorrhagia. The pain in the ovary is generally aggravated at the menstrual period. The constitutional symptoms are generally produced from the confinement of the patient, made necessary by the suffering caused by taking active exercise. There is often headache, mental depression, indigestion, and anæmia, ending in general debility. It should be understood that the symptoms alone will not suffice to make a diagnosis, because in many cases they arise more directly from the condition of the ovary rather than from its malposition.

Physical Signs.—The method of making a vaginal examination by the touch, to detect a prolapsus of the ovaries is as follows: The finger should be carried as far upward on either side of the cervix uteri as the vaginal wall will permit, and then brought downward toward the sacrum, so that if the ovary is displaced it will be caught between the examining finger and the sacrum. In that way it can be outlined by palpation, and its sensitiveness determined. Its mobility or fixation can also be determined in this way. I have frequently found while teaching my class of post-graduates that these few hints would enable them to find the displaced ovaries when they had tried in vain to make out their location. When an ovary is completely prolapsed, it is found directly behind the cervix uteri in the most dependent portion of the sac of Douglas. So exactly central is the position of the ovary that in most of my cases I could not tell whether it was the right or left ovary, and could only settle that question by finding the other one in its normal position. If the prolapsus is incomplete the ovary is found on one side of the cervix uteri, usually at a point a little above the junction of the body and cervix. In complete prolapsus the ovary feels not unlike the fundus uteri, and gives the impression of retroflexion of the uterus. The distinction can be made by the peculiar sensitiveness of the ovary to pressure, and by the fact that the finger can usually be insinuated between the uterus and the ovary. Should there still be a doubt, the question can be solved by passing the sound which will exclude flexion of the uterus.

There is another condition which proves to be somewhat puzzling, that is complete prolapsus of the ovary with the retroverted uterus lying directly upon and above it. In one such case which came under my care, I was able to make out the true state of affairs by passing the sound, and while it was in place raising the uterus far enough to lift it off the ovary, so that by the touch I could distinguish the one from the other.

Prognosis.—The prospect of permanently overcoming the displacement depends upon the length of time that the malposition has existed; upon the condition of the ovary, whether normal or diseased, and whether there are other complications, such as adhesions, retroversion, or retroflexion of the uterus. In recent uncomplicated cases a permanent restoration may be effected if the patient can be kept under treatment for a sufficient length of time. In complicated cases all ordinary local treatment fails. It is then that the question of advisability of removing the ovaries comes up for consideration. Should the patient be near the menopause, she may be carried along past that change, and the recovery may come. In younger subjects the ovaries should be removed if all else fails to give relief.

Causation.—The following are the causes of displacement of the ovaries, named, as far as my knowledge guides me, in the order of their frequency.

Subinvolution; enlargement of the ovaries from hyperæmia, ovaritis, or other affections; displacements of the uterus; congenital malposition from derangements of development and growth. In regard to subinvolution, it may be well to call to mind the fact that in the puerperal state, the ovaries—especially the left one—are very large, nearly twice as large as at other times, and if care is not taken to secure complete involution after confinement the heavy ovaries will naturally descend, and by making traction upon the peritonæum and ligaments will overstretch them. I believe also that subinvolution of the broad ligaments will permit the ovaries to descend into the pelvis when they are not much enlarged. At any rate, I have found the ovaries prolapsed when they were not large, but when the broad ligaments were long and relaxed, a condition which followed confinement. In regard to the other causes of prolapsus of the ovaries they are sufficiently clear to warrant my saying nothing more about them.

Treatment.—The first thing to do is to ascertain if the displaced ovary is movable and can be raised up to its normal position. If that can not be accomplished, owing to adhesions, then there is little to be hoped for from treatment. When the ovary is movable it can be placed in position by putting the patient in the knee-chest position, using a Sims's speculum, and then making upward pressure through the vaginal wall with a sponge held in a sponge-holder. In short, the same method is employed as in restoring a retroverted uterus. To keep the ovary in place the cotton tampon is the best. It should be removed every forty-eight hours, and two or three times daily the patient should take the knee-chest position if she is able to be up from bed during the day. The use of the tampon in this way takes much time, and I have taught several of my nurses to use it with very satisfactory results.

Prof. Goodell recommended that the patient should separate the labia while in the knee-chest position, in order to distend the vagina with air, and Dr. C. F. Campbell uses for the same purpose a glass tube open at both ends, which is introduced into the vagina before the patient takes the knee-chest position. I have tried both of these methods, but have given them up for two reasons: In the first place, because distention of the vagina is unnecessary. In the knee-chest position the pelvic organs will rise high enough and assume their normal position as well with the vagina closed as open; of this, any one can satisfy one's self by making an examination before and after this position has been assumed. In the second place, I find that the less local treatment patients give themselves the better it is for them. The first medical book of any kind that I ever read was entitled "Every Man his own Physician," by one Dr. Buchan. It was a very useless production, but had the good effect of prejudicing me against making every woman her own gynecologist. I much prefer the tampon and the knee-chest position. If there is retroversion or flexion of the uterus present at the same time, that organ should be replaced each time that the tampon is changed. When considerable has been gained by the above treatment, and the ovaries and uterus are replaced sufficiently to get a pessary under them, one should be introduced. The form of instrument and the method of using it are the same as in retroversion of the uterus and need not be detailed here. I have tried the special forms of pessaries recommended by Tait, Mundé, and others, but have not been able to do as well with them as with the instrument which I employ in retroversion of the uterus. In a few cases I have succeeded in forcing the uterus, ovaries, and vaginal wall upward and backward, thus giving some relief for a time, but the traction upon the vaginal wall causes stretching, and when the pessary is removed the displacement returns to a degree as great if not greater than before.

While this local treatment is employed every effort should be made to improve the patient's general health. Rest should be insisted upon, in the recumbent position at first, and as the case progresses favorably, short stages of exercise may be permitted. Throughout the whole treatment all sexual relations should be proscribed.

When all other treatment fails, and the patient still remains a useless invalid, the ovaries should be removed, or attached to the upper margin of the broad ligament or abdominal wall.

CHAPTER XXVII.

NEOPLASMS OF THE OVARIES.

I HAVE made a classification of the morbid growths of the ovaries which I believe will best serve the practical requirements of the gynecologist, although it may not be quite in keeping with the arrangement of the subject usually found in the text-books. In fact, it would be hardly possible to make any classification which would agree with all of the many authorities on the subject. Nor would it be possible to present an argument in favor of the classification which I have adopted without either taking more time and space than I can afford, or else omitting to mention the statements of many whose views are well worthy of consideration. I am obliged to simply state in brief that which to my mind appears necessary to the student and practitioner.

The first class is made up wholly of cystic tumors, with a single exception, to which I shall refer later, and of these there are two varieties—follicular cysts and adenoid cystomata. Both of these varieties occur in a simple and in a compound form. Thus we may have (*a*) simple unilocular cystoma, and (*b*) simple follicular cysts, or of the compound form we may have (*c*), multiple follicular cysts, (*d*) multiple cystoma, (*e*) multilocular cystoma, (*f*) papillary cystoma, and (*g*) dermoid cystoma; and also (*h*) fibrous, and (*i*) cysto-fibroma.

The second class, which many speak of as malignant growths, contains four varieties: (*a*) carcinoma, (*b*) cysto-carcinoma, (*c*) sarcoma, and (*d*) cysto-sarcoma.

Classification.—These morbid growths I have arranged in two classes:

1. Those that are most frequently seen in practice, and that are to some extent amenable to surgical treatment.

2. Those that are rarely met with, and that resist all kinds of surgical treatment, and tend by their very nature to a fatal termination.

Tumors of the first class are spoken of by some authorities as benign, while the term malignant is applied to those which I have placed in my second class.

OVARIAN CYSTS.

Pathology.—The kind of ovarian neoplasm most frequently seen is the cystic tumor, or ovarian cyst, as it is generally called.

The development and growth of ovarian cysts and cystomata vary in different cases in many respects, and still there is a certain sameness in the majority. The growth of these has been divided into three stages, the division being based upon certain features of the natural history of these neoplasms rather than upon any changes in their pathology. In the first stage the tumor is small, and confined to the pelvic cavity. This stage begins with the formation of the morbid growth and ends when it is large enough to rise out of the pelvis into the abdominal cavity. The duration of this stage can not be estimated, because there is no way by which the morbid growth can be detected until it has attained considerable size. In many cases an ovarian tumor gives rise to no marked disturbance, and therefore remains unnoticed until it has reached the second stage. This stage begins when the tumor rises up into the abdomen, and ends when the patient's general health begins to deteriorate. These constitutional effects of the morbid growth mark the beginning of the third stage. The first stage often passes by without the presence of any abnormality being suspected. It is only when pressure upon the pelvic organs or when some inflammatory action in the ovary or pelvic peritonæum occurs, that there is any likelihood of the affection being discovered. There is reason to believe, from the cases which have been watched, that the growth is steadily progressive as it is in other neoplasms. The natural history of non-malignant tumors is that they go on gradually increasing until they attain a size sufficient to destroy life. This requires from two to three years on the average, but there is a great variation in time in different cases. There are periods of cessation of growth followed by rapid increase in size. These alternations of increase and passiveness may occur repeatedly, or the progress may be continuous.

In the third stage the general health of the patient begins to suffer. There is usually loss of flesh, and the face shows evidence of ill-health. A certain facial expression has been described as the facies ovarii, but this is difficult to describe or recognize. It may be said to be an emaciated, careworn appearance, without the bronze hue of the cachectic state. This malnutrition is due at first to exhaustion from the growth of the tumor, and finally to pressure upon the neighboring organs. The functions of the abdominal and thoracic organs become deranged from pressure, and cause exhaustion and death by slow degrees.

Death sometimes comes suddenly from asphyxia due to pressure upon the thoracic organs. Sometimes peritonitis is the immediate cause of death. In the majority of cases that are permitted to run their course, the patient is slowly crowded out of existence by the enormous size of the tumor. Fortunately, there are few cases in this age that are permitted to be lost in this way.

Toward the end of the third stage œdema of the limbs generally appears. This is more likely to occur if the patient is unable to lie down in bed.

The simple cyst is the most easily comprehended, and will therefore be first described. It is composed of the cyst proper and the pedicle. The cyst is made up of the cyst-wall and the contained fluid.

The pedicle is usually composed of the ovarian ligament, Fallopian tube, and part of the broad ligament. The cyst and the pedicle have one covering in common—namely, the peritonæum.

Simple Cysts.—The simple cyst is usually globular in form, and its walls are generally of uniform thickness. The size varies in different cases from a microscopic object to one weighing one hundred pounds or more, according to the age of the growth. By the term

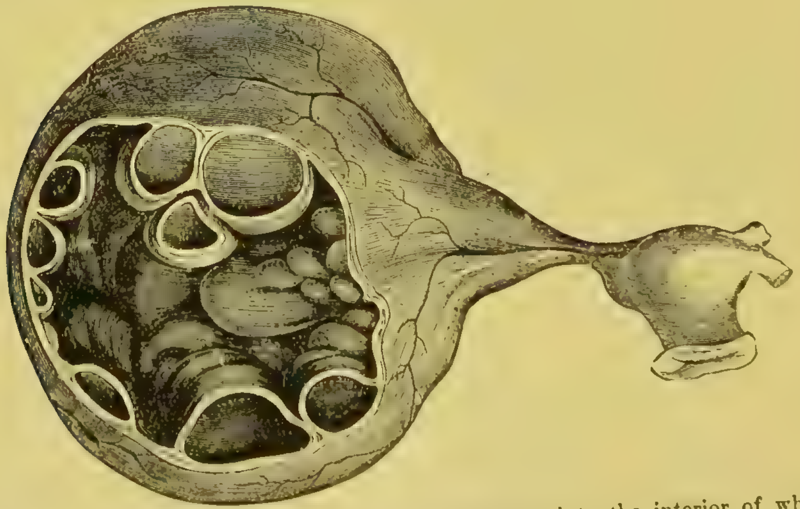

FIG. 214.—Left ovary distended into one large cyst, into the interior of which smaller cysts project (Farre).

simple or unilocular cyst it is not intended to imply that the tumor is absolutely composed of a single cyst, since it is believed by the best authorities that ovarian cysts are always multiple, but the term is applied to that variety of cyst which in its gross anatomy appears to be single, and which can be managed by the surgeon as a single cyst. The one sac or cyst is large and appears to be single, but on close inspection minute cysts are generally found in varying numbers in the major cyst, or in that portion of it which joins the pedicle.

Compound Cysts.—These are distinguished from the simple variety by being multiple—that is, the whole tumor or mass is formed by the aggregation of several simple cysts, each being large enough to be easily recognized. The usual form of this multiple variety of cyst is that in which one of the divisions or cysts is much larger than all the others taken together. The greater contains the lesser ones, which are usually formed in a cluster attached to one side of the major cyst, near the pedicle.

It will be observed that the difference between the single and multiple cyst is, that in the latter there are a number of well-defined cysts, one large one and a number of others varying in size from that of a man's head to a small hazelnut, while the former is composed of one cyst with a few almost imperceptible cysts.

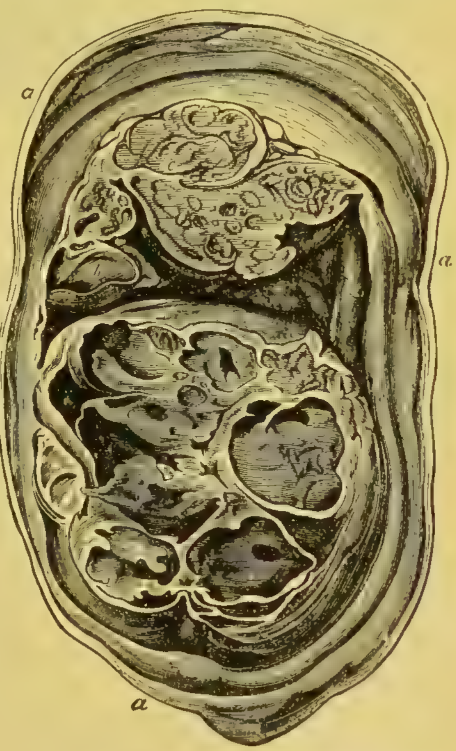

Fig. 215.—Compound and proliferating cyst (Farre).

Multilocular Cysts. — These are so called because the sacs or cysts, which in the aggregate make up the whole tumor, are larger in size and more nearly equal. The general appearance of the mass is of one large cyst-wall containing a number of cysts which vary in size. Sometimes one or more of the cysts is much larger than the others. In other cases there are several cysts varying in size from that of a human head to that of an orange, with a large number of smaller cysts.

From the general appearance and arrangement it would seem that the cysts included within the major cyst-wall had been developed from the inner cyst-wall, and others still had been developed from the second crop by a process of endogenous proliferation. This may or may not be the fact, but it is more likely that the ovary from which the morbid growth is developed contains a number of germs included in the structure of the ovary which forms the cyst-wall, and that they all grew from similar germs and are aggregations rather than proliferations. The gross appearance of such tumors is the chief point of interest to the surgeon, viz., that one cyst-wall contains within it a number of cysts; usually, there are one or two large cysts, a larger number of medium size, and a very great number of small ones varying in size and united to each other. The cavities of these cysts rarely communicate with each other. Occasionally a cyst is found the cavity of which is divided by septa, but associated with such there is always a number of independent cysts.

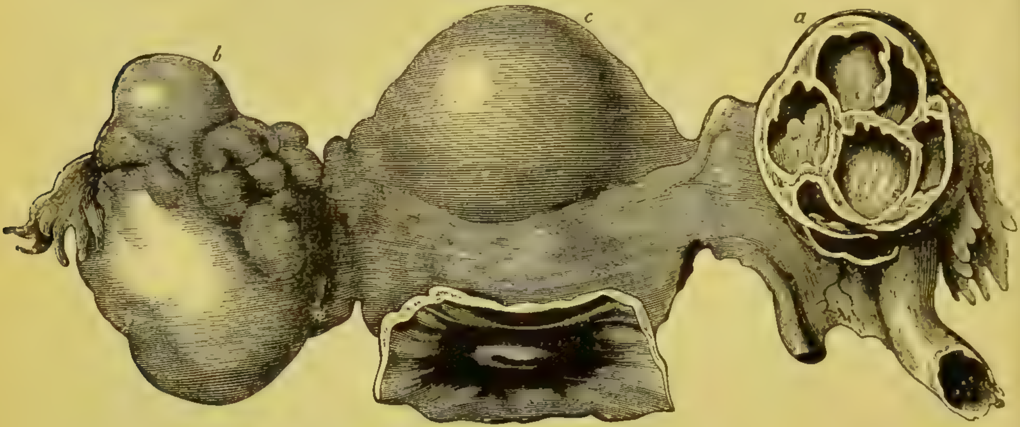

FIG. 216.—Multilocular cyst (Hooper).

I have, on one occasion, seen two cystomata growing from an ovary, one on each side, the whole resembling somewhat a dumb-bell in shape.

Complex Cystoma.—These tumors are called complex or mixed because they differ from those already described by the addition to the cyst structures of other pathological elements, or else there is a marked development of some special portion of the cyst elements—the cyst-wall, for example.

These peculiar portions of the growth may consist of a hypertrophic increase in the tissues of an ovarian follicle, or of hypertrophy of the stroma of the ovary, infiltrated with serum or other morbid fluids. Proliferation of the fibrous tissue may give rise to one or more fibrous masses connected with the cyst. The cyst-wall may be greatly thickened generally, or in certain portions, from hypertrophy of either its inner or middle layer. The inner surface or lining membrane of a cyst may develop new structures or proliferations. Again, the contents of a cyst may be of a character entirely different from the ordinary fluid found in simple or compound cystic tumors. In this way the following complex tumors are formed:

Papillary Cysts.—In this form of cyst the connective tissue of the cyst-wall undergoes hyperplasia in certain places, and the growth of the tissue pushes the lining membrane of the cyst before it, and in that way a great number of papillæ are found projecting into the major cyst and covering, it may be, the whole internal surface of the sac. The papillæ are sometimes very vascular, and are covered with columnar epithelium.

Paroöphoritic Cysts.—These cysts, which, as their name implies, are developed in the paroöphoron, present, according to Bland Sutton, the following differences from oöphoritic cysts (the ordinary ovarian cysts): They are, as a rule, unilocular; do not affect the shape of the ovary until they have attained an important size; always burrow between the layers of the mesosalpinx; when large, make their way between the layers of the broad ligament by the side of the uterus, and their interior is beset with warts, which are very vascular, bleed freely, and are frequently calcified. It is to be borne in

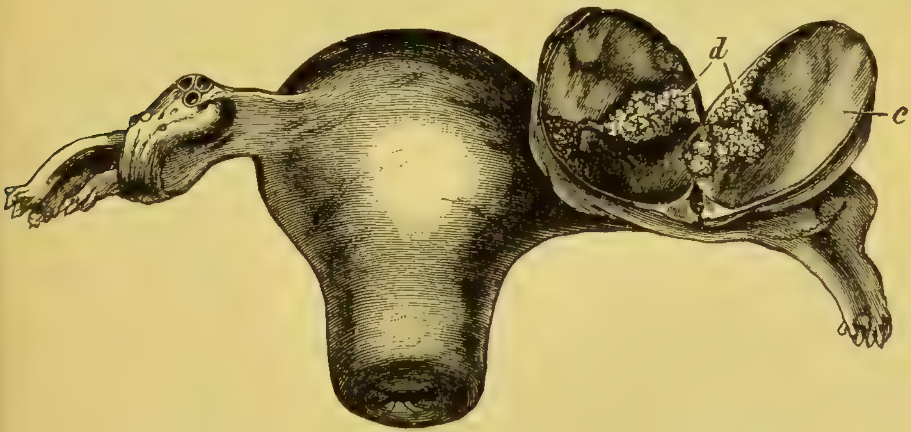

FIG. 217.—Papillary cystoma of ovary showing proliferation (Winckel).

mind, however, that although these paroöphoritic cysts contain warts or papillomata, still other cysts may also be papillomatous.

Dermoid Cysts.—Ovarian dermoids occur much more frequently than is generally thought. According to Olshausen, they form four per cent of all ovarian tumors. In them have been found hair, sebaceous glands, sweat glands, teeth, mammæ, horn, nails, bone, unstriped muscle, a well-formed heart, a tongue, a trachea, an eye, and what has been regarded as brain tissue. They occur at almost every period of life. It is said that they have been found at birth, but Bland Sutton, who has studied the subject of dermoids most thoroughly, is unable to find the evidence of so early a case. He refers to an authenticated one in a child of one year and eight months. They have also been found in patients above eighty years of age.

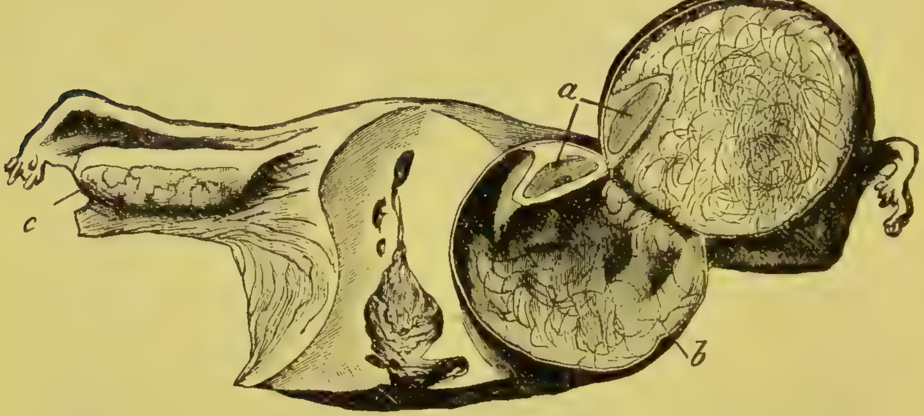

FIG. 218.—Dermoid cyst of ovary, filled with hair and tallow-like masses (Winckel).

Various theories have been advanced to explain their formation. The one which seems to me the most plausible is that of A. W. Johnstone, M. D., of Cincinnati. He regards the process as a true parthenogenesis, in which the ovum itself is at fault. For some unexplained and probably inexplicable reason it retains one of its polar cells and goes on, under the stimulus of this male element, to form a human body in a weak and very incomplete way, giving us the great variety of tissues already mentioned as having been found as constituents of dermoids. As a consequence, while the hypertrophic change which takes place in other ovarian follicles produces ordinary cystomata, that which occurs in a follicle in which exists an ovum that still retains a polar cell will result in the formation of a dermoid.

Cysto-Fibroma.—In this form of tumor the fibrous portions closely resemble, in structure, fibrous tumors of the uterus. They do not differ in their outward appearance from the ordinary simple cyst, but the touch shows one part of the mass to be solid and the other fluid. These morbid growths are quite rare. I have met with but two in my own practice.

FIBROMA OF THE OVARIES.

This rare form of ovarian tumor I have classed with the cystomata, not because it presents any features in common with the class, but because it calls for surgical interference and does not in any way belong to the second class, having no inherent tendency to prove fatal except by indirect effects. It is rare, and hence not of sufficient importance to demand a separate class for itself alone. In describing this form of neoplasm I may say that it is like the cysto-fibroma, minus the cyst or cysts. The composition of the growth is similar to that of the fibroid tumors of the uterus. That the fibroma of the ovary is very closely related to the cysto-fibroma, is further shown from the fact that so-called fibromata have been found with small cysts. In the one the cyst element predominates, while in the other the solid or fibrous element is the principal or only one found.

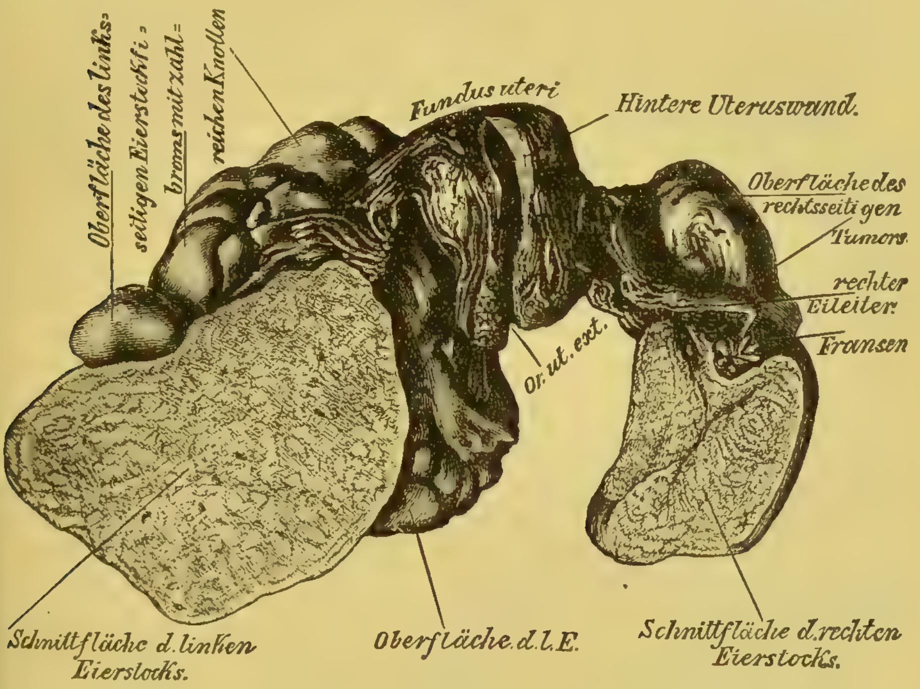

FIG. 219.—Fibroma affecting both ovaries (Winckel).

Cyst-Wall.—The walls of the cysts of ovarian tumors are, as a rule, nearly all the same. For convenience of description and for the purposes of the surgeon the wall is divided into three layers. The external is a serous membrane corresponding to the peritonæum, which it is in fact. The middle coat is areolar tissue, and contains the main blood-vessels of the cyst. The internal layer is like the external, so far as its fibrous elements are concerned, but it is really a mucous membrane. It is less uniform than the other layers in appearance, and usually contains small cysts in process of development, or follicles which have undergone degeneration. Papillæ are often found developed on this layer, as already stated. While this in a general way describes the cyst-walls, they are subject to certain modifications, as follows: The middle layer, which is well defined at the base of the tumor, contains the large vessels, and is easily separated from the peritoneal layer. It becomes thinner the farther it departs from the pedicle, and when it reaches about the middle of the tumor there are only two layers easily distinguished, while at the summit there is only one that can be made out by ordinary dissection.

While the middle layer diminishes gradually as it gets farther and farther away from the base and finally disappears, the internal and external layers come together and are united, and increase in thickness so that the cyst-wall becomes a fibrous homogeneous membrane. Some authors have made more minute subdivisions of the layers of the cyst-wall, but that I look upon as a super-refinement in dissection which has no value in this connection.

The outer and inner coats are often modified in appearance and character. The external layer is changed in places by circumscribed peritonitis, or by great vascularity, and the internal coat is often changed by inflammatory action, degeneration, or hyperplasia.

The appearance of the outer coat has a special interest for the surgeon. To be able to recognize the cyst-wall when one comes to it in operating is very important. Many times, in simple uncomplicated cases, the cyst-wall is smooth, of a whitish color, slightly tinged with a pinkish, pearly tint which resembles the peritonæum, everywhere covering the abdominal viscera, and yet easily distinguished. When there has been peritonitis, the cyst-wall becomes covered with lymph or adhesions, and so changed in appearance that it is difficult to recognize it when it is reached, owing to the products of inflammation. The vascularity of the outer coat of the cyst varies greatly. Sometimes the whole surface presents a fine network of vessels all over the parts that are seen; in other cases the vascularity is exaggerated in patches. This great vascularity, when it occurs without preceding evidence of inflammation, makes a marked contrast between the cyst and the abdominal viscera, which enables one to promptly distinguish the one from the other. In a few tumors, all of them occurring in oldish patients, I have found large portions of the cyst-wall of a pale, grayish-white color, without any recognizable vascularity. This made the cyst very peculiar in appearance and easily recognized. This rare and peculiar color is caused by commencing necrosis.

Contents of Ovarian Cysts.—The contents of the simplest variety of cyst are a serous fluid of a lemon or amber color, but subject to marked variation in different cases. The character of the fluid is modified by the size of the cyst, the length of time it has existed, and whether the cyst has been tapped; under these modifying influences the fluid may be colorless, or chocolate-colored from the presence of blood in varying quantity, or it may be of a greenish-yellow color, from the presence of pus produced by inflammation of the cyst. Shreds and flakes of whitish lymph are sometimes found with the pus when there has been inflammation. Occasionally the fluid is viscid.

It generally contains albumen or paralbumen, and sometimes crystals of cholesterine are found in it. The contents of the multilocular cysts resemble those just described, presenting the same differences in different patients. Usually the fluid is more viscid or gelatinous, sometimes quite thick, so that it escapes with difficulty. In one case I found the cyst contents exactly like jelly, but different in character in this, that jelly is friable, but this material was exceedingly tenacious, so that it could not be pressed out of the sac, and was even pulled out with the hand with great difficulty. The fluid in the several cysts of a multilocular tumor is not always the same. It often differs in color and consistency in the different divisions of the tumor. In addition to the albumen, blood, cholesterine, pus, and lymph, which may be present in the fluid of ovarian cysts, there are other chemical and anatomical elements found which are of interest.

The contents of ovarian cysts have been most thoroughly investigated as to their chemical composition by Eichwald. As has already been stated, they may be as fluid as serum, or, as is more often the case, viscid sometimes to such a degree as to be gelatinous in consistency. The specific gravity may be as low as 1007, or as high as 1020. There are two distinct classes of elements which occur in the contents of these cysts: the one mucous in its nature, which predominates in the younger cysts; the other albuminous, which is characteristic of the large and older colloid cysts. The colloid substance is regarded as a modified mucine formed from the substance of the colloid bodies and the parenchyma of the cells of the ovaries. Colloid degeneration is therefore but another name for mucous metamorphosis. The first or mucine class consists of four elements: the substance of the colloid corpuscles, mucines, colloid substance, and muco-peptone. These are distinguished by their solubility in water, and by various reactions which need not be mentioned here.

The second or albuminous class is characterized by the presence in the contents of the cysts of free albumen and the albuminate of soda. In colloid tumors the free albumen becomes albuminoid peptone, while the albuminate undergoes no change. The conversion of free albumen takes place slowly; it first becomes paralbumen, then metalbumen. These are not fixed bodies, but pass on to the condition of peptone. Thus, the albuminous elements which are found in this albuminous class are albuminous paralbumen, metalbumen, and albuminoid peptone. In a chemical analysis of the contents of a cyst, Eichwald found the following to be its composition:

Water	931.96
Organic substances.	59.77
Potass. sulph.	.08
" chlor.	.59
Sod. nit.	6.29
" phosph	.16
" carb	.38
Salts insoluble in water	.74
Loss	.03
	1000.00

MICROSCOPIC CONTENTS OF OVARIAN CYSTS.

Under the microscope the contents of different cysts present very different appearances. The cell elements abound in those which are colloid in their nature, while those which are serous are very deficient in this respect. Eichwald, in one of the colloid cysts, found so large an amount of corpuscular elements that he was unable to examine it satisfactorily with the microscope until he had diluted it with water. When thus treated he found fatty elements, round and serrated cells, large colloid cells, round cells resembling those described by Lebert as pyoid bodies, and by Henle as exudation corpuscles; globular aggregations of various sizes, scales of epithelium, crystals of cholesterine, and brown pigment were also found. As a rule, the morphological elements found in the fluid of ovarian cysts are granular cells, free granules, small oil-globules, epithelial cells, blood-corpuscles, Gluge's corpuscles, and pus cells. From time to time various cells have been described as characteristic of the ovarian cyst. Among others, Drysdale has described such a cell, which he speaks of as "the ovarian granular cell," and which he regards as pathognomonic of ovarian disease. His claim to the discovery of this cell is thus put: "I claim, then, that a granular cell has been discovered by me in ovarian fluid, which differs in its behavior with acetic acid and ether from any other known granular cell found in the abdominal cavity, and which, by means of these reagents, can be readily recognized as the cell that has been described; and, further, that by the use of the microscope, assisted by these tests, we may distinguish the fluid from ovarian cysts from all other abdominal dropsical fluids."

This "ovarian granular cell" of Drysdale is generally round, but sometimes oval, is very delicate and transparent, and contains a number of fine granules, but no nucleus. The size of the cell varies from $\frac{1}{5.000}$ inch to $\frac{1}{2.000}$ inch. When acetic acid is brought in contact with this cell it becomes more transparent, and its granules appear more distinct. On the other hand, when thus treated with acetic acid it becomes larger, and from one to four nuclei appear. It is distinguished from Gluge's inflammation corpuscle by the fact that, when ether is added, the ovarian cell is unaffected—at most, has its granules made paler; while Gluge's corpuscle loses its granular appearance, and sometimes entirely disappears through a solution of its contents by the ether. In reference to this subject it may be said that the views of Drysdale deserve the most careful consideration, but I am not as yet satisfied in my own mind that this corpuscle is pathognomonic of ovarian disease, nor indeed that the diagnosis can be positively made by either chemical or microscopical analysis.

Complications.—There are certain pathological changes which occasionally occur during the progress of an ovarian tumor which may be considered as complications of the original affection. The presence of an ovarian tumor tends to excite circumscribed inflammation of the peritonæum, which gives rise to adhesions of the cyst or tumor to the pelvic or abdominal viscera. This is the most frequent complication, and one which is of exceeding interest to the surgeon. The location, extent, and firmness of the adhesions differ greatly according to the duration, size, and character of the cyst or tumor. It is also possible that the state of the patient's constitution and general health may have some influence in determining the development of inflammatory adhesions. In regard to the effect which the nature of the tumor has upon the occurrence of adhesions my observations lead me to believe that malignant growths and those that are mixed—that is, in part benign and in part malignant—are most frequently found to have adhesions. It is also a question whether the adhesions found by some of these neoplasms result in all cases from peritoneal inflammation. In some cases that I have seen it appeared to me that the ovarian tumor became attached to the viscera in contact with it by an extension of the ovarian disease. It may be that in such cases the malignant disease may have begun in other organs and tissues as well as in the ovary, and that the diseased parts became united without intervening products of inflammation; occasionally adhesions occur where the tumor is small, and then they are found in the pelvis or in relation with the lower intestines. When they take place after the tumor is large enough to distend the abdominal walls they are found higher up. Then the tumor may be adherent to the abdominal wall, omentum, stomach, loin, diaphragm, or to the lumbar region. Such extensive adhesions are rather rare, still they occur sufficiently often to be of the greatest interest to the surgeon. These adhesions sometimes displace the pelvic organs and derange their functions. When a small tumor becomes adherent to the uterus or bladder it will carry these organs up out of place when it grows larger and rises up into the abdominal cavity.

Obstruction of the intestines may be caused by the traction of adhesions and also by the pressure of a very large tumor. Occasionally a small tumor in the pelvis may make pressure upon the rectum sufficient to obstruct the action of the bowels, but that is rather rare, unless the tumor is so firmly fixed by adhesion that it can not be dislodged. Rotation of the tumor upon its axis occasionally takes place. This produces twisting of the pedicle and partial or complete strangulation of the blood-vessels and tissues of the pedicles. The result is that the blood can not return from the tumor, and hence the vessels become overdistended and sometimes rupture follows. The bleeding into the cyst suddenly distends it and causes shock. Sometimes the cyst ruptures under the pressure of the hæmorrhage within it and death may take place. Cases have been known of hæmorrhage into the cyst which have proved fatal from shock and loss of blood without the cyst bursting. Should the patient withstand the shock and hæmorrhage, peritonitis and cystitis are likely to occur.

Death takes place as a rule, if the twisting of the pedicle is sufficient to completely arrest the circulation. This proves fatal unless the tumor is removed. If the twisting is not sufficiently marked to arrest the nutrition of the tumor suddenly and completely atrophy may take place instead of gangrene or necrosis. Spontaneous cure has taken place in this way, the tumor shriveling up and disappearing. Some very curious things have happened from twisting of the pedicle. Atrophy has taken place so perfectly that the pedicle has been severed, the tumor becoming entirely free from all attachments.

More strange things still have happened. The tumor has become adherent to some part of the abdominal viscera and subsequently the pedicle has become separated from the tumor by a process of slow atrophy. While the separation of the pedicle is slowly disappearing the vascularity increases at the point of adhesion, and the tumor derives its nourishment from its new attachment. This has been described as transplantation, a term which clearly indicates the process which takes place.

Dragging of the Pedicle gives results similar to twisting. This dragging is produced usually when pregnancy occurs during the existence of an ovarian tumor. The uterus growing faster than the pedicle pushes the tumor upward and makes strong and continuous traction upon the pedicle and obstructs the vessels. Again, if the ovary is adherent in the pelvis, and the pregnant uterus ascends, traction will be made sufficient to damage the nutrition of the ovary and any cyst that may exist there. There is another way in which traction of the pedicle may occur. A cyst or tumor may be carried high up in the abdomen with the pregnant uterus, and become adherent at its higher part, and when the uterus descends after delivery the pedicle may become stretched. It is presumed that cystic tumors may become atrophied and a spontaneous recovery occur. This belief is based upon the fact that in old women the ovaries have been found to contain shrunken cysts imbedded in very hard, thickened stroma and it is believed that this condition is the result of atrophy by cystic tumors. There is no absolute proof that absorption of the fluid and shriveling of the cyst-wall occurs except by obstruction of the blood-vessels in the pedicle as already described.

Rupture and Perforation of Ovarian Cysts.—Rupture may occur as the result of overdistention of the cyst-wall from rapid accumulation of fluid in the cyst, or from injuries such as direct blows or concussions from falling or sudden exertion. The bursting of a cyst may cause death, or the opening may be closed by inflammatory exudation and the cyst refill. It has also been claimed that the cyst may disappear, and the patient recover. When this spontaneous recovery occurs after the bursting of a cyst, there is always room for doubt about its being an ovarian cyst. For the present it must remain an open question whether ovarian cysts ever disappear in this way. It is, however, well known that cysts of the ovary frequently burst and empty their contents into the abdominal cavity. The results of this differ greatly; sometimes there is not much trouble if the fluid is clear and non-irritating; in other cases death is caused in a short time by shock, or peritonitis may follow and cause death or terminate in closing the opening in the cyst and forming extensive adhesions of the cyst- and abdominal-walls and viscera. In those cases which recover from the shock of rupture and the subsequent peritonitis and the cysts refill there are always extensive adhesions found.

Perforation differs from rupture in being a slow process and in the fact that the opening is frequently into the adjoining viscera of the abdomen or pelvis. There are two ways in which perforations occur; the one by thinning of the cyst-wall from pressure, either from within the cyst or from without at a given point, and the other and most frequent by suppuration or ulceration. Perforation occurring in either way may open into the peritonæum, but in case the opening is the result of suppuration it may be into some of the neighboring organs. In some cases the perforation is very small and the opening is closed by exudations which also form adhesions to the neighboring organs. This fact has led to the belief that many of the adhesions found are the result of these small perforations which admit of a limited escape of the cyst fluid. Should the perforation be large a free escape of the fluid may take place, and the result would be the same as in case of rupture. When the perforation is into the intestine, the contents of the sac may be wholly emptied, but this form of perforation is rare.

Another rare form of perforation has been seen in which a communication between an ovarian cyst was formed by ulceration extending from the intestine and opening into the cyst.

Ovarian Cystitis.—Inflammation of the interior of the cyst occurs occasionally and is a serious complication. In multiple and multilocular cysts the inflammation is usually limited to one or more of the cysts, the others in the tumor remaining in their original condition. The inflammation is of a low form in most cases and ends in suppuration; in others there is a mixture of pus with shreds and flakes of lymph. The original fluid in the cyst is supplanted to a large extent by these products of inflammation.

This was well illustrated in a case of a monocyst which came under my care years ago. I tapped the cyst, and withdrew a half a pint of clear fluid, inflammation followed, and the cyst slowly filled up but did not increase beyond its original size. It became adherent to the abdominal wall and finally opened externally, and it was then found to be filled with pus.

In another case a hypodermic syringe full of clear fluid was drawn off from the major cyst of an ovarian tumor, and then inflammation followed, and the patient was subsequently brought to me for operation. I found pus and lymph in the cyst, but the most of the original clear fluid had disappeared.

Abdominal dropsy is still another complication which may occur. There is in many cases a little free fluid in the peritoneal cavity which is not of special interest, but in other cases the quantity of fluid is such that it may in bulk exceed that of the ovarian tumor. This is more likely to occur in malignant growths and in papillary ovarian cysts. This will be referred to again while discussing diagnosis and treatment.

There are many local and constitutional conditions which may be found accompanying ovarian tumors, but those complications which can be rationally considered as resulting from the affection of the ovary have been mentioned.

CHAPTER XXVIII.

CYSTIC TUMORS OF THE OVARIES—SYMPTOMATOLOGY AND PHYSICAL SIGNS.

THE most peculiar feature in the clinical history of this variety of ovarian tumor is the fact that subjective symptoms are often absent. Cases are sometimes seen in which the patient is unconscious of anything being wrong until the tumor becomes noticeable by the increased size of the abdomen. It is equally strange that the tumor is often unobserved by the patient until it has attained a considerable size. But, while cases occur without noticeable symptoms, the majority of patients suffer from some pain and discomfort, and at the same time there is more or less derangement of the function of the ovaries, and occasionally some disturbance of neighboring organs. The symptoms differ in the different stages of the growth of the tumor. I will, therefore, take up the three stages in order. In the first stage, while the tumor still occupies the pelvic cavity, the patient may have a feeling of fullness in the pelvis, and possibly some pelvic tenesmus on standing or walking; pain is also present in the affected side. The severity of the pain differs greatly in different cases. In some it is only sufficient to attract the attention of the patient at times, but is not acute enough to prevent her from performing her ordinary duties. In others it is quite severe, and accompanied with well-defined tenderness, disabling the patient to some extent. These symptoms may or may not be continuous. The pain may be at times very slight for days or weeks, then increase, and again subside, and yet at no time be sufficiently marked to cause the sufferer to seek advice, and its existence is only brought out by interrogation at a more advanced stage of the affection. When the pain is acute and sufficient to disable the patient, there is usually some local inflammation to account for it. When such is the case, there is ordinarily some constitutional disturbance indicative of the local affection. In quite a number of cases there is pain for a few days at or just before the menstrual period, or it may be midway between the periods.

The pain is in the affected ovary, and is often of that character which is called ovarian. It has been supposed that this kind of intermittent pain is due to ovulation, occurring in the morbid ovary. When the pain occurs in the intra-menstrual period, it is presumed to be caused by some trouble during the maturation of the ovule; and, when it comes on about the menstrual period, it is due to the process of rupture of the Graafian vesicle. Menstruation is frequently deranged, but not always. While one ovary is affected, the other may be normal, and, so far as the ovaries influence menstruation, there is no change, and the uterine function goes on in the usual way. This is sometimes the case when both ovaries are affected. It would appear that, while a part of the ovaries is morbid, there still remains enough that is normal to perform the function and maintain the ovarian influence upon menstruation. It frequently happens, however, that menstruation is deranged during the existence of ovarian tumors. As already stated, there may be pain at the menstrual period, which is easily mistaken for dysmenorrhœa. Irregularity or suppression of the menses is, I believe, the most common derangement. Profuse and too frequent menstruation occasionally occurs, but either of these derangements may be due to some constitutional condition or some uterine affection, which may accompany the ovarian tumor. When the ovarian tumor attains considerable size, and is yet not large enough to rise out of the pelvis, it may cause displacement of the uterus or bladder, and give rise to symptoms peculiar to this displacement. It is not often that these cause sufficient suffering to lead the patient to seek relief at the hands of the gynecologist. When the left ovary is the subject of the morbid growth, there is, in some cases, slight obstruction of the rectum, which causes disturbance in the action of the bowels.

The important fact still remains that, in the first stage of cystic tumors of the ovaries that are uncomplicated, the symptoms are often so mild that the patient may not come under the care of the medical attendant, and, if she does, the symptoms do not afford any reliable guide to the nature of the affection.

In short, there is nothing diagnostic in the symptomatology of this stage of ovarian tumors.

In the second stage, an enlargement of the abdomen is noticed sooner or later by the patient. If the pedicle is short, the enlargement may be on one side; usually it is central, or nearly so, when first noticed. Here, again, there are no other very well-marked symptoms. As the tumor increases, the weight and pressure cause discomfort. This is likely to be felt earlier in those who have not borne children than in those who have. In such patients the abdominal muscles do not yield so readily to accommodate the tumor. Slight pains recurring at intervals and tenderness are common symptoms, and are usually due to tension of the cystic walls from increase of the contents. When such pains occur, the tension of the cyst is marked, and the pain subsides when the cyst becomes flaccid. If inflammation of the cyst or portions of the peritonæum occurs, there are, in addition to pain and tenderness, some constitutional symptoms, such as fever, rigors, and, if the inflammation is extensive, deranged digestion, loss of flesh, and hectic may follow. These symptoms are relied upon as indicating inflammation, which will produce adhesions, especially if the peritonæum is involved; but it should be borne in mind that quite extensive adhesions may take place without their having been at any time well-defined symptoms of circumscribed peritonitis. Ordinarily, these are all the symptoms manifested in the second stage.

In the third stage, when the tumor begins to make strong pressure upon the different viscera, another class of symptoms appears. These were hinted at while discussing the growth of ovarian tumors. Deranged digestion and impaired micturition, difficult breathing, distressing weight, and a dragging on the abdominal muscles, together with pain and tenderness, may all supervene. Some of the symptoms which characterize the first stage, and disappear in the second, often recur in the third. Pressure on the bladder may cause frequent urination, and the bowels may become obstinately constipated. Paroxysms of pain in the limbs and abdomen may be very severe, caused by obstructed circulation. From the same cause effusion of fluid into the abdominal cavity and œdema of the legs may occur.

The patient becomes emaciated, weak, and sometimes hectic, but not, as a rule, cachectic in the benign forms of ovarian tumors.

Physical Signs.—The physical examination of ovarian tumors is made by the means generally employed, and fully described in the first chapter of this work. They are inspection, vaginal touch, palpation, percussion, auscultation, measurement, exploration by aspiration, microscopical and chemical examination of fluid obtained by aspiration, and, finally, laparotomy. The evidence obtained by physical exploration differs in each stage of the growth of ovarian tumors. In the first stage, the bimanual examination of the pelvic contents is all that is necessary, this giving all the information which can be obtained, except in obscure cases, where aspiration may be advisable. Sometimes it may be necessary to pass the sound into the uterus to confirm or correct the impressions obtained by the touch. Occasionally, also, when the parts are tender and resisting, it is necessary to give an anæsthetic in order to make a satisfactory examination. The method of searching for small ovarian cysts in the pelvis is the same as that recommended in prolapsus of the ovary, and described in a previous chapter. Where the tumor has attained any considerable size, the bimanual touch gives the most satisfactory evidence. The tumor, caught between the fingers of the two hands, can be outlined, and its consistence ascertained with a tolerable degree of accuracy.

In the early stage the cyst is usually found on one side of the pelvis, or else in the sac of Douglas, exactly behind the uterus, or a little inclined to one side. It is usually soft and slightly yielding to the touch, sometimes globular and smooth of surface, or else globular in the main, with some irregular projections. These irregularities are due to the presence of small cysts and the portions of the ovary that remain normal.

The physical signs obtained by this examination determine the fact that there is a neoplasm, and that it is possibly cystic; but there is no direct, positive evidence regarding the structure of the tumor, nor that it is ovarian. In other words, the physical signs are not diagnostic—i. e., direct and positive. It is necessary, on this account, to employ the method of diagnosis by exclusion.

Differential Diagnosis in the First Stage.—There are many affections which may present symptoms and signs remotely resembling cystic tumors of the ovary. Those which most nearly approach them in character are, dilatation of the Fallopian tube from hydrosalpinx or pyosalpinx, parovarian cysts when small, extra-uterine pregnancy, pregnancy in a bicornute uterus, subperitoneal fibroids of the uterus, fibroid tumor of the ovary, and tumors of the second class, which include the cystic and solid malignant growths, and in a less degree pelvic hematocele, pelvic peritonitis, and cellulitis.

Fecal accumulations in the upper part of the rectum, and backward dislocations of the uterus, have also been mentioned as simulating ovarian tumors, but these can be so easily differentiated that they need only to be named. Dilatation of the Fallopian tube may be distinguished from a cystic ovary by its oblong shape, and sometimes, when the tube is low down in the sac of Douglas, the normal ovary can be felt above the tube by the bimanual touch. In case the dilatation of the tube is due to pyosalpinx, the history will tell of a previous inflammation, and the constitutional symptoms are usually more marked. Should it be necessary to make an immediate diagnosis, the tumor may be aspirated, and the characteristic epithelium of the tube, if found by the microscope, will decide the question. It is safer and surer to wait and watch the progress of the case. In time the ovarian tumors will grow and rise out of the pelvis, while in case of a dilated tube there will not be any great increase in size, but there will be more local and constitutional disturbance. This difference in the progress of the two affections is the most reliable means of differentiation. Parovarian cysts can not be distinguished from ovarian when they are small, unless the ovary can be separated from the cyst, and ascertained to be normal. Fortunately, it is not of great importance to distinguish the one form of cyst from the other in the first stage of their growth. Extra-uterine pregnancy presents physical signs which can not always be distinguished from those of ovarian tumors, and in both there is a gradual increase in size, so that neither the physical signs nor the progress of the case are reliable aids in diagnosis. The general signs and symptoms are usually sufficient to decide. In cases of doubt, the electrical treatment which arrests the progress of the gestation should be tried. Pregnancy in the uterus bicornis may be detected by finding the other horn of the uterus, and perhaps the ovaries may be found normal. These conditions are rare, and will not frequently come up as questions of diagnosis in ovarian affections.

Small, subperitoneal fibroids of the uterus differ from ovarian cysts in being firm to the touch, and generally accompanied with enlargement of the uterus and menorrhagia. They are, when small, usually united closely to the uterus. An ovarian cyst is likely to be mistaken for a fibroid of the uterus when it is very tense and adherent to the uterus by inflammatory adhesions. Here, again, time will determine, because the ovarian will grow faster than the uterine tumor, and will show its characteristics more clearly the larger it grows. A fibroid tumor of the ovary can not be distinguished from a tense ovarian cyst or a fibro-cyst of the ovary in all cases by physical signs, but the history will help materially in making a diagnosis, and, when the fibroid becomes large enough to rise out of the pelvis, its solid character will be easily made out.

Neither can a fibro-cyst of the ovary be distinguished from a multiple cystic tumor in which the cyst-walls are very thick. But the diagnosis of the exact composition of such tumors is not of any practical importance in relation to treatment.

From what has been said it will be seen that the question to be decided is, Whether the tumor found in the pelvis is ovarian or not; and, when that is settled, the next question which arises is, What is the nature of the tumor? If it can be determined that the tumor belongs to the first class of ovarian neoplasms, that will suffice for such cases. It is otherwise in tumors of the second class, because in malignant affections it is important to make a diagnosis early. If the tumor is of the first class, no harm can come from waiting, while, if it is of the second, surgical interference may be necessary while the tumor is yet small. The physical signs of malignant ovarian tumors will be spoken of in another chapter, but I may briefly state here that the density and irregularity of outline, so commonly found in malignant disease elsewhere, are wanting in the cystic tumors of the ovary. The constitutional disturbances are usually developed early in malignant diseases, while it is otherwise in the benign forms.

Pelvic hematocele, pelvic peritonitis and cellulitis may, after the acute stage of these affections has subsided, present certain physical signs, which may lead one to suspect an ovarian cystic tumor. But the history of such affections will put the diagnostician on his guard, so that time may be given to see whether the tumor which has been discovered grows, as it will do if it is a cystic ovary, except in rare cases of an ovarian cyst arrested in its growth by inflammation or other causes.

Differential Diagnosis in the Second and Third Stages.—By the time that such a tumor has escaped from the pelvic to the abdominal cavity, and attracts attention by its presence there, it will have attained a size equal to that of the gravid uterus at the fifth month of gestation. In patients of spare habit it might be noticed sooner, but quite as often it escapes notice until a much later period. The physical signs which are of most value to the diagnostician in the second stage are enlargement of the abdomen, especially of the lower portion; some irregularity in the form of the abdomen, one side being larger than the other, and the lower being larger proportionately than the upper; the tumor is well defined and movable in the cavity of the abdomen, most freely from side to side. It is elastic and fluctuating, the fluctuation extending through the whole tumor if a mono-cyst, while, if a multiple cystic tumor, the fluctuation may be limited to sections of the tumor. The tumor does not change its form to any extent when the position of the patient is changed, neither does the form of the abdomen change. It is attached to the pelvic organs, and if drawn upward will drag the broad ligament with it. The gross and microscopic appearances and chemical composition of the fluid obtained by aspiration are also to be regarded. The contents of the cyst are characteristic to some extent of the affection, as is also the appearance of the cyst as seen after opening the abdomen. The physical signs are very few, and none of them alone is diagnostic. In fact, each of them may be found in other conditions than cystic ovarian tumors; hence arises the difficulty of making a diagnosis. The signs and the means of detecting them may now be discussed.

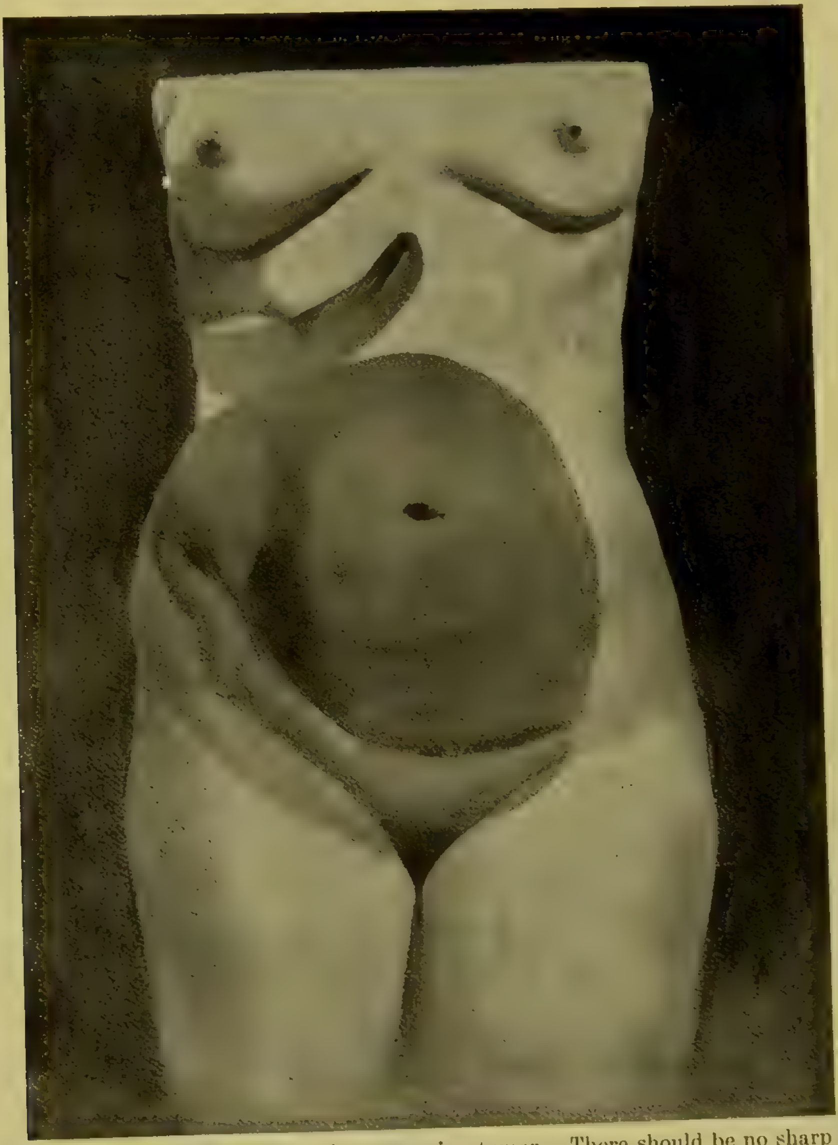

FIG. 220.—Area of dullness in a large ovarian tumor. There should be no sharp lower limit. The shaded crescent above represents liver dullness.

By inspection the increased size of the abdomen is detected. In the second stage this is most marked at the lower portion. The increase in size may be uniform, the two sides being alike, or one side may be larger than the other, and in some cases there is an irregularity of outline of the tumor which gives a nodular appearance upon

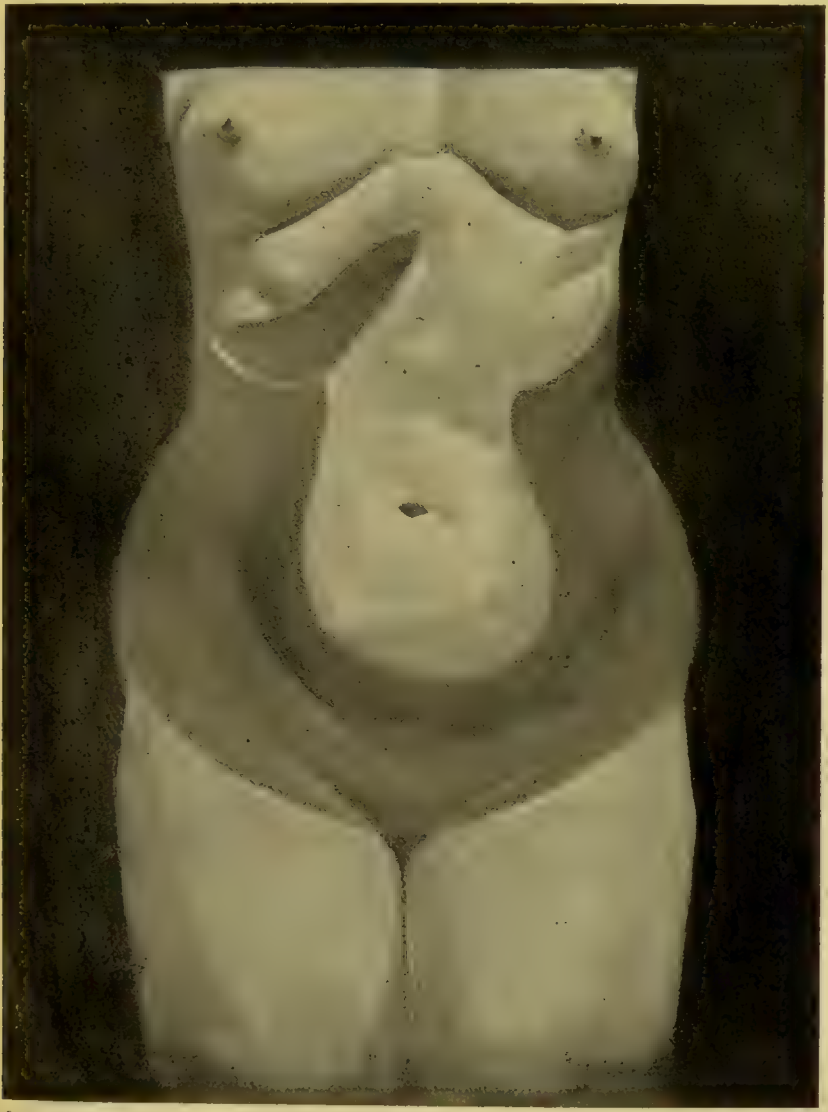

Fig. 221.—Area of dullness in ascites, indicated by shaded portion running up to the liver dullness. The tympanitic note about the navel is due to the floating of the intestines.

inspection, and which is also apparent to the touch. A tumor large enough to be noticeable in the abdomen is usually in the center, and when it is eccentric it is because of adhesions, as a rule.

The irregular outline or nodular appearance is indicative of a multiple or multilocular tumor. By palpation the tumor can usually be distinctly outlined. This is always the case, unless the tumor is very flaccid and there is much fat in the abdominal walls, or the bowels are distended, but it is rare that these two conditions are found together. By grasping the tumor in both hands, it can be moved from side to side in the abdominal cavity. It can be felt sliding about under the abdominal walls. When there are extensive adhesions, this valuable sign, mobility, is wanting. By inspection the mobility may be detected by causing the patient to take deep inspirations and expirations, which will cause the tumor to move up and down beneath the abdominal walls. This movement will be absent if there are adhesions.

The vaginal touch may detect a portion of the tumor in the pelvis, or may show that the round globular mass rests on the pelvic brim. The uterus can be made out, in a large number of cases, as normal, and not directly connected with the tumor, although it may be displaced. Beyond this the touch per vaginam only gives valuable negative evidence. Palpation also shows that the tumor is clearly outlined and easily distinguished from the neighboring organs in some cases. When the cyst is tense the tumor can be easily outlined, but when flaccid, as often occurs, it is not by any means easy to map out its boundaries. Percussion assists in outlining the tumor when it is not clearly defined to the touch. The flatness on percussion over the tumor contrasted with the tympanitic resonance of the intestines, will indicate its size and position.

The consistence can be determined by palpation, whether solid and very hard, solid and soft, or fluid and fluctuating. Fluctuation, as a sign of encysted fluid, may be obtained in several ways. If the tumor is a monocyst and is large enough to touch the walls of the abdomen on both sides, diametrical fluctuation can be obtained by placing the fingers upon one side and percussing diametrically opposite. The fluctuating wave will be easily found if the contents of the cyst are markedly fluid. If the tumor is divided into several sacs, fluctuation can only be obtained by palpating sections of it. Resting the fingers of one hand at one point on the abdomen, and percussing at another point a little distance from that at which the fingers rest, a surface wave will be produced. In case the fluid is semi-solid, and does not give the clear wave on percussion, fluctuation may be produced by placing the fingers of both hands upon the tumor some distance apart; then, by making pressure with the fingers of one hand, the contents of the cyst will be pressed under the fingers of the other. This is fluctuation by displacement, not by the wave produced by pressure.

The fact that fluctuation is limited and does not extend throughout the whole abdominal cavity is most valuable evidence that the fluid is encysted. Further evidence of this is also obtained by another sign, that is, the tumor does not change its form when the position of the patient is changed. By turning the patient first on one side and then on the other, it will be observed that while the tumor may gravitate to the lower side it does not change its form.

In the second stage it can be ascertained that the tumor is attached to the broad ligament. This sign is obtained by passing the finger of one hand into the vagina and then pushing up the tumor with the other. By this means the tumor will be observed to drag upon the broad ligament. In regard to the signs obtained by an examination of the contents of the cyst, it may be said that it is not often that this need be resorted to in the second stage, but when it is, the reader should turn to the description of the contents of ovarian cysts for all desired information on this point. The physical signs of ovarian and other abdominal tumors obtained by laparotomy are, of course, peculiar to each. The descriptions of these appearances may help one to recognize such tumors when seen and felt, but much experience in observation is necessary to tell what a tumor is when one sees it in the abdominal cavity. The ambitious and rash may open the abdomen to make a diagnosis, and be unable to recognize that which they find. While I clearly appreciate the value of laparotomy as a means of diagnosis in obscure cases, I am as fully aware that it should only be undertaken by one possessing comprehensive knowledge gained by extensive experience.

There are certain other affections and conditions which resemble to some extent ovarian tumors in the second stage. The chief of these are pregnancy, normal and pathological, neoplasms of the uterus, such as fibroids and fibro-cysts; distended bladder; fecal impaction; encysted fluid in the peritoneal cavity, e. g., in tubercular peritonitis; cysts of the kidney, liver, or spleen; enlargement and displacement of the spleen, kidney, or liver; cancerous disease of any of the abdominal organs, omentum or abdominal glands; and parovarian cysts.

Pregnancy, in its normal state, differs greatly from ovarian tumors in all respects but the fact that both gravid uterus and the tumor occupy the abdominal cavity, still a number of cases have been reported in which an error in diagnosis was made, and ovariotomy undertaken when the case was one of pregnancy. In several of these cases the trocar has been thrust into the uterus, the operator believing that he was tapping an ovarian cyst. At the present time such a mistake can only be made through want of knowledge or lack of attention. One might, in trying to make a diagnosis, mistake the pregnant uterus for an ovarian cyst, but upon opening the abdomen one having knowledge enough to warrant him in undertaking ovariotomy ought to be able to tell the one from the other by sight.

When there is any doubt it is far better to wait until the end of the time of gestation. This can always be done. There is no good reason for removing an ovarian cyst until it is as large as, or larger than, the uterus at full term of gestation in doubtful cases. While I believe in removing ovarian tumors in the second stage of their development when the diagnosis is clear, in case there is room for doubt whether the case is one of ovarian cyst or of pregnancy, time will decide, and there is no valid argument against waiting.

The fact is that those who are the least capable of making a diagnosis are the most inclined to operate early, and this, I presume, accounts for the mistakes recorded.

I need not give the differential diagnosis between ovarian tumors and normal pregnancy; the symptoms and signs of the former have been given, and those of the latter can be found in any text-book on obstetrics, if not already familiar to the reader, and they are so very different that by contrast the diagnosis can be made.

Extra-Uterine Pregnancy.—This usually comes up for diagnosis in connection with the first stage in the growth of ovarian tumors, as has already been stated. It is only the abdominal variety which in any way resembles ovarian tumors in the second stage. The signs of a living child in the abdomen are so perfectly diagnostic that they can hardly be mistaken. In case the child is dead, more difficulty might be experienced in making a diagnosis. The history of the case and *ballottement*, or the ability to move the dead child in the sac, will usually suffice to settle the question.

Rupture of an Ovarian Cyst.—This, and the extensive adhesions which follow, most closely resemble ventral pregnancy after the death of the child, both in history and in physical signs, and I can understand that it might be impossible to discover the exact nature of the trouble without the aid of laparotomy. Fortunately, under these circumstances it would be perfectly right to employ this method of making the diagnosis, because it is part of the appropriate treatment in either case.

In the cases of abdominal pregnancy that I have seen the diagnosis was very easy; so much so that no one with any experience could have made the mistake of suspecting ovarian tumor.

Uterine Fibroids and Fibro-Cysts, when large, present some of the evidences of ovarian tumors. The position of the tumor in the abdomen, and its shape and mobility, are the same as those of some ovarian tumors, and these are the only resemblances.

In fibroids, the uterus is enlarged as shown by the touch and sound. The tumor is solid and is intimately connected with the uterus, in fact forms a part of it. In the majority of cases the cavity of the uterus can be probed, and will be found enlarged in case the tumor is uterine, while it will not be if the tumor is ovarian.

Distended Bladder has been mistaken for a cyst of the ovary, but only at a first examination or by one not used to such cases. When the bladder is overdistended there is incontinence, usually the urine coming away constantly, or in spurts when the patient moves. This leads the medical attendant to suppose that the bladder must be empty and that the tumor is an ovarian cyst, but the catheter readily settles the question, and it should always be used in cases with such histories.

Fecal Impaction has always been mentioned as one of the conditions which might be mistaken for an ovarian tumor, but I have not considered such a thing possible. The irregular form and solid character of the fecal mass differs in every respect from ovarian tumors of all the benign variety.

Encysted Dropsy of the Peritonæum.—This is an extremely rare affection and occurs in the progress of tubercular disease as a rule, and follows an attack of peritonitis. The physical signs differ, in that the fluctuation is not so general as in ovarian cyst, and the fixation is complete. The surface of the abdomen is not so prominent as in case of a cyst, but often has irregular depressions, as well as elevations, and the veins are not prominent.

The general health is greatly reduced early in the progress of the disease; nutrition is markedly impaired, and there is often septicæmia in case that there is pus encysted.

The vaginal examination is often quite sufficient to settle the diagnosis, by showing that the pelvic organs are normal and can be outlined and separated from the mass in the abdomen. When this can be accomplished, ovarian disease is at once excluded.

Enlargement and Cysts of the Liver, Spleen, and Kidneys.—In all of these the diagnosis, so far as the exclusion of ovarian disease, can be easily made if the cases are seen early, or a correct history can be obtained. It is found that in them all the enlargement begins above and on one side, and, as a rule, is fixed there from the beginning, and the pelvic organs can be separated from the tumor above, and proved to have no connection with the morbid growth, and to be normal. These two diagnostic facts will suffice in most cases to settle the question, but additional evidence can be obtained from the general history of the growth and its effects upon the general health, also the composition of the fluid in cysts, which should be obtained by aspiration in doubtful cases.

In regard to the differential diagnosis in cancer of the pelvic and abdominal organs, this will be discussed in connection with these affections, and hence is omitted here.

Parovarian Cysts, or serous cysts of the broad ligament, as they are called, are not very easily recognized at all times. Fortunately it would be no very great mistake to remove one of these cysts supposing that it was an ovarian cyst. They are very rare as compared with ovarian cysts, they grow slowly, and occur mostly in young persons. The general health does not suffer, as a rule. The physical signs differ in no way from those of the ovarian monocyst, except that the fluctuation is more distinct and the fluid differs, being clear like water and without albumen. Tapping, or rather exploratory aspiration, is the means to be employed to settle the diagnosis, and should be practiced when there is a doubt.

Affections which resemble Ovarian Neoplasms in the Third Stage.—There are only a few affections which resemble ovarian cysts in the third stage. These are ascites, uterine fibro-cysts, and very large uterine fibromata.

The first mentioned, ascites, is the most likely to be mistaken for ovarian cyst. The chief points of difference in history are, that ascites is, as a rule, preceded by some acute disease or general ill-health, suggestive of some chronic disease of the liver, heart, or kidneys. There is anasarca also in most cases of ascites, and the patient is generally anæmic early in the progress of the disease. The enlargement of the abdomen comes on rather suddenly, and is not confined to its lower part; that is, it is not circumscribed. The expression of the face, while showing anæmia in ascites, is not anxious, as it usually is in ovarian cyst. The history of ovarian cyst in growth and general constitutional symptoms is almost the reverse of ascites.

The physical signs of ascites differ from ovarian cyst, chiefly in that the fluid in ascites changes its position with every change in the position of the patient. When the patient is placed upon the back, the abdomen is symmetrical and flat; in the erect position, the lower portion bulges from the gravitation of the fluid, and the same change in the position of the fluid occurs when the patient is turned toward either side. With these changes in the position of the fluid, there is a change in the resonance on percussion. The flatness is found at the most dependent part, while the resonance is found at the upper.

In large cysts there is dullness or flatness on percussion at all points except the flanks, where there is always resonance, except when the colon is distended with gas and fixed deep in the side, so that the fluid of ascites can not gravitate below it; and in ovarian cyst there may be dullness on percussion in the side due to fecal impaction of the colon.

There is another exception to the rule that in ascites there is always resonance at the highest point of the abdomen whatever the position of the patient may be, and that is when the disturbance of the abdomen is extreme, and the mesentery is not long enough to permit the intestines to rise to the top of the fluid while the patient is upon the back. There is also a difference in the fluids, which gives some help in the diagnosis in case aspiration is practicable, as it may be in doubtful cases.

Uterine Fibro-Cysts or Fibromata seldom attain sufficient size to resemble ovarian cysts, but occasionally they do so. The fibro-cysts of the uterus more closely simulate the ovarian cystic tumors than the fibromata. The difference in the history and the fact that the uterus is involved in the tumor in fibro-cyst and free in the other form, are the chief points of difference. This subject was discussed in treating of the diagnosis in the second stage of ovarian tumors, and need not be repeated in full in this connection.

Intraligamentous Ovarian Cystomata.—I deem this variety of ovarian tumor of sufficient importance to merit a separate consideration.

The difference between intraligamentous and the ordinary forms of ovarian cystomata is simply in the position they occupy in relation to the ligaments. The location may be called an unnatural one, because it differs from that which ovarian cystomata usually occupy.

The intraligamentous ovarian cystomata are comparatively quite rare. This suggests that the causes operative in determining their location are exceptional. Two theories have been advanced to explain the topographical anatomy of intraligamentous cystomata. The one assumes that, owing to some error of development, the ovary, during embryonic life, finds its way into the folds of the broad ligament and there remains. In that case, if a cystoma of the abnormally located ovary occurs it is certain to split up the ligament and convert it into a capsule for itself.

The second theory is, that during the growth of the cystoma it burrows, so to speak, into the folds of the ligament, and once having insinuated itself there pushes the folds apart, and these folds grow with the cystoma and form a ligamentous capsule for it. In order that this may come about, the ovary must be closely attached to the ligament, in place of being held by a special fold of peritonæum, which leaves it to some extent free from the ligament proper. Or the ovary may be bound down to the ligament by an inflammatory adhesion. Where a cyst develops deep in the ovary and meets resistance on the free peritoneal surface, it pushes its way in between the folds of the ligament. There is good evidence in favor of this theory in the fact that these cystomata come from the paroöphoron, which is the portion of the ovary that is nearest to the uterine ligament. Furthermore, I have in one of my own cases found the ovary from which the cystomata came imbedded in the posterior fold of the ligament. It would be more correct, perhaps, to say that the ovary was stretched out upon the posterior fold of the ligament. It was so changed in form that I should have overlooked it had it not been that there were several small cysts in it surrounded by what appeared to be ovarian stroma.

In another case I found, while enucleating the cyst, that it was very firmly adherent at a point in the posterior fold of the ligament where the ovary should be found. The vessels were larger at that point than anywhere else, which led me to think that the ovary was there; but the tissues were so changed by inflammatory products that I could not positively detect any ovarian tissue. This, I think, is sufficient to settle this point in the pathology and causation of some of these cystomata, and presumably the larger portion, if not all, of them. Still, it may be admitted that malposition of the ovary, because of a lesion of development, may obtain in some cases.

Pathology.—These cystomata may be single or multiple. I think, however, they are more often single. All of my own cases, eight in number, have been monocysts. Another interesting feature is that they are generally papillary or proliferous cysts. This, according to some authorities, notably Bland Sutton, of London, is due to the fact that they are developed from the deeper structures of the ovary, the paroöphoron, as already noted.

The position of these cystomata and their relations to the pelvic organs have a very important bearing upon the question of treatment, as will be seen further on.

In my own practice, I have found them occupying widely differing positions in relation to the ligaments and pelvic organs. In some, the tumor was situated in one ligament, displacing the uterus to the opposite side of the pelvis, and, in a lesser degree, the bladder also. In others, the tumor occupied a position in both ligaments and between the uterus and bladder. When thus located the tumor, uterus, bladder, and ligaments have been found high up out of the pelvis, so that the most dependent portion of the tumor could not be easily reached through the vagina. Again, I have found the tumor behind both the uterus and bladder, and yet between the folds of both ligaments. In all these the pelvic organs were carried up into the abdominal cavity, while the tumor descended deeply into the pelvis. It appears that there is a rule which determines the location of those tumors which occupy both ligaments, in regard to their relations to the pelvic and abdominal cavities. This rule may be formulated as follows: When the tumor is between the uterus and bladder, all three structures rise up into the abdomen; whereas, if both of these organs are in front of the tumor, it dips well down into the pelvis. The reason is, that in the one case the vagina arrests the process of burrowing downward, while in the other there is no resistance to the descent of the cystoma.

In all cases the broad ligaments become greatly enlarged and thickened, usually covering the whole cyst, although they are thinned out at the upper portion. When the cyst does not descend into the pelvis and has attained considerable size, the upper portion of the cyst may present a wall of medium thickness; in fact, the ligaments diminish in thickness and vascularity until there is little left but the peritonæum; and the upper part of the cyst then appears more like an ordinary intraperitoneal ovarian cystoma.

These facts are of the utmost importance in regard to treatment, and hence the reason for this brief account of the various positions in which these intraligamentous cystomata may occur.

Symptomatology.—These tumors cause more pain and functional derangement of the pelvic organs than the ordinary ovarian cystomata, but in other respects the history is the same.

Physical Signs.—The diagnosis of such cases is of interest chiefly because of the difficulties encountered in operating and the urgent necessity of clearly comprehending the exact conditions present, in order to manage them to the best advantage. I have found it impossible to make a complete and comprehensive diagnosis in all cases. It is generally possible to make out that there was a cystoma in the broad ligament, but with no definite certainty as to its position and topographical anatomy. Judging from the literature of the subject, it appears that others have suffered from a like uncertainty in some cases. When a cystic tumor exists in the abdomen and is firmly fixed below, with no history of inflammation during the earlier stages of the growth of the tumor, and the uterus is drawn up out of the pelvis and lies behind or in front of the cystoma, I suspect that it is intraligamentous. If the uterus is displaced laterally in a marked degree by the cystoma that is present, or if the cyst descends deep down into the pelvis while the uterus is high up and in front of the cyst, the facts point to the same conclusion. When a portion of the tumor found in the pelvis is cystic, this is a great aid; but, as a rule, these tumors, as already stated, are proliferous, and there is so much solid material in the most dependent part that fluctuation is not found, and the tumor appears to be solid to the touch and may be mistaken for a fibroma or fibrocyst of the uterus. One case was seen by two well-known ovariotomists, and both suspected fibroma of the uterus as well as ovarian cystoma. My first impressions were the same, but upon opening the abdomen I found the uterus normal, but displaced upward by an intraligamentous ovarian cystoma.

Cases may be divided into two classes—those in which a complete diagnosis can be made, and those in which the diagnosis is incomplete. In the one, the nature and composition of the tumor, its relations to the abdominal and pelvic organs, and the extent and location of its attachments, can be clearly determined; in the other, which is incomplete, there may be sufficient evidence to warrant either operative treatment or a full assurance that the case is not amenable to surgical treatment. The first or complete diagnosis can be made from the usual physical signs and the history. The incomplete diagnosis may be made complete by surgical means, such as aspirating or by laparatomy. It is of the utmost importance to differentiate between these two classes of cases. When only a partial diagnosis can be made, leaving doubts as to a possible malignant element existing in the case, the question of the propriety of ovariotomy may be determined by an examination of the intraperitoneal fluid, which is often present. If this proves negative, the operation is advisable; while, if the cells characteristic of malignant disease are found, the case should be left alone. Keeping still to the question of diagnosis, I may say that in cases of intraligamentous cystomata one can usually make sure that an operation is called for and is justifiable, but the diagnosis must often remain incomplete until the abdomen is opened. At the same time it is not an easy task to complete the diagnosis after laparotomy. A few words on this subject may be admissible, in view of the importance of the matter. We hear much of making an exploratory operation for diagnostic purposes, but I am satisfied that skill and experience are very necessary to do this. To recognize just what is present, and to determine what to do in these cases when the tumor is exposed, is no easy task; and still, upon a rapid inspection and palpation, and prompt decision regarding the exact conditions and how to manage them, depends the success of the surgeon in complicated cases. I may not have seen or carefully thought of all the conditions which simulate, and hence may be mistaken for, intraligamentous cystomata, but such observations as I have made cover the most important part of the ground.

When the tumor is exposed by laparotomy its intraligamentous character can be determined by incising the peritonæum, which will retract and expose the cyst-wall. In all other tumors the peritonæum is so closely adherent that no retraction occurs. The appearance resembles most closely a uterine fibroma, and owing to the thickness of its walls it feels to the touch like a fibroma, especially if the cyst has very tense walls, as usually is the case; but by resting one finger on the tumor and percussing the abdominal wall at a distant point, fluctuation can be unmistakably made out. This excludes fibroma at once, but still leaves the possibility of the tumor being a uterine fibrocyst, and, although this is not important as bearing upon the main question of removal of the tumor, it affects the method of procedure and should be correctly decided at once. This can be done by tapping, which shows the character of the fluid, which is all-sufficient, with few exceptions. If pus is found, it may be impossible to say whether the cyst is uterine or ovarian. The tapping, however, gives more room for the introduction of the hand, which enables the operator to make out the attachments and the relation of the tumor to the pelvic organs, and thereby complete the differentiation.

The pregnant uterus also looks, in color and vascularity, like this form of tumor, and may lead to doubt. At least I think that when this mistake has been made, an intraligamentous tumor must have been suspected, because it is the only ovarian cystoma that appears at all like the uterus. This can be made clear by observing contractions of the uterus, which can be easily excited, and by passing the hand into the abdomen the ovaries can be found, and the condition of the cervix uteri and normal ligaments will show that there is pregnancy.

Treatment.—These tumors require special treatment, owing to the fact that they are not pedunculated like the ordinary cystomata, but are encapsulated, and differ in their relations to the pelvic organs.

The several methods adopted in operating are as follows: Enucleation ranks first, because it is adapted to more cases, perhaps, than any other. This well-known method, devised and introduced by Dr. Miner, of Buffalo, has been practiced by many ovariotomists. It was employed in the treatment of ordinary pedunculated cystoma when first brought out, and is now seldom practiced except in parovarian cysts. In fact, I do not think that Dr. Miner ever employed his method in the treatment of the class of cases now under consideration; but if he did, he omitted a description of some of the details which are necessary. Enucleation is adapted to all cases in which the cystoma descends into the pelvis, completely separating one or both ligaments. In all such cases it should be tried, and it will succeed well unless there has been inflammatory action which has firmly united the cyst-wall and folds of the ligaments, or the cyst-wall is thin and friable.

In such conditions the enucleation may prove to be impossible, and other means of treatment, to be hereafter noted, must be adopted. In the first place, it is important to tap the cyst high up, in order to avoid wounding the thickest portion of the broad ligament. To do this it is sometimes necessary to extend the incision in the wall of the abdomen higher than usual. The cyst being emptied and drawn well out of the wound, the separation of the ligament and cyst-wall should be begun at that point high up where the ligament is so thinned out as to be hardly noticeable. When the dissection is begun all around, the capsule can be lifted up and the dissection continued with the knife-handle, and finally the deeper portions can be separated with the finger. The traction should be made upon the cyst-wall, as the capsule or ligaments is easily lacerated. During enucleation, if any large vessel, artery, or vein is injured, it should be ligated or controlled with forceps at once. The management of the ligaments, after the cystoma is removed, is first directed to the control of hæmorrhage. In some cases a general oozing is all that there is. Occasionally a wounded vessel here and there needs ligating. When the cyst extends deep down into the pelvis, there is often very troublesome bleeding from veins. These should be ligated, if possible; but if that can not be done, pressure with a hot sponge should be tried, and, if that fail, styptics may be used. The ligamentous capsule now presents a pouch, the inner surface of which is raw, and from which there will be some bleeding and much serous oozing. This should be treated as follows: The upper portion of the opposing sides should be folded in so as to bring the peritoneal surfaces together, and these should be fixed by a continuous catgut suture. The suturing should begin on both sides, and be from the sides toward the center, and close the parts, except at a point beneath the abdominal wound, where an open space should be left for the drainage-tube. If the ligaments thus approximated by sutures can be brought up to the lower angle of the abdominal wound, they should be fixed to the abdominal wall by silk sutures passed through the ligaments on each side of the opening for the drainage-tube, and then through the wall of the abdomen. When the ligaments can not be brought up to the wall of the abdomen, a drainage-tube without side-openings, should be carried down to the bottom of the cavity.

While this mode of treatment is perfectly satisfactory in suitable cases, there are difficulties attending the operation in exceptional cases, and hence certain dangers The cyst-wall may be easily torn, and there is liability of leaving portions of it. When this happens, it is necessary to destroy the secreting surface. This may possibly be done by applying pure carbolic acid. The most difficult part of the operation is, in some cases, to stop the bleeding. This has been referred to; but I may say further, that the oozing at the time of operating, and the liability to suppuration which may occur afterward, render the convalescence rather tedious in many cases.

The next procedure is to remove the cystoma, and its capsule also, by ligating the ligament below the tumor. This method is adapted to those cases in which the cyst is situated in one broad ligament and does not dip down very far into the pelvis. Such cases are described in books as having a very broad pedicle, but the most that can be correctly said of them is that they are partially pedunculated. In this condition the ligament can be ligated with the repeated continuous ligature. This is applied in the following manner: One end of the ligature is passed through the ligament and a portion of it tied, then the other end of it is passed through the portion which is already ligated, carried forward, and brought back through the ligament in such a way as to secure another portion, and the two ends again tied, and so on until the whole is secured. The cyst and its capsule are then cut off. This leaves no cavity, arrests all possible hæmorrhage, and in this respect is all that can be desired. But there are difficulties and dangers that may arise, even in cases where the method is applicable. There is danger of wounding the ureter or including it in the ligature. A knowledge of the location of the ureter and its anatomical relations is not always sufficient to guard against this accident, because the ureter may be displaced. By drawing the cyst and ligament out of the abdominal wound, it may be possible to see that the ureter is not in the way; but this can not always be done, and then one has to depend upon the touch to localize the ureter and avoid it. This is possible, owing to the fact that the ureter feels like a cord crossing the ligament; but in case the tissues are thickened by inflammatory products it is difficult indeed to find the ureter.

There is still another way of managing these cases, and that is by a combination of the two methods already described. It is well adapted to cases that can be enucleated easily, and has the advantage of surely avoiding the ureter. The cyst is first enucleated, and the capsule, or so-called pedicle, is tied and cut off. The advantages are, that it is easier to handle the capsule after the cyst is removed, and there is no danger of including any portion of the cyst in the ligature—an accident that may occur in operating by the second method alone. There is one fortunate feature in this method of treatment, viz., in case enucleation can not be effected, ligation alone can be resorted to. It is well, then, to try enucleation, even if it has to be abandoned.

There still remain for consideration tumors that can not be removed by any of the methods known at the present time, and there are such. A cystoma that descends into the pelvis and has become firmly adherent to the ligaments by inflammatory products, can not be enucleated, neither can the capsule be ligated. At least enucleation can not be done with any degree of safety. That complete removal of such tumors has been tried, is no doubt true, but the result has been to open into the rectum, and cause uncontrollable bleeding or peritonitis, either of which must prove fatal. These complications are always present in suppurating intraligamentous cystomata, and hence when pus is found on tapping, it may be inferred that enucleation is impossible. I have found, however, that a non-suppurative cellulitis has so firmly united the cyst-wall to the ligamentous capsule that they could not be separated. The treatment of such cases is by drainage. I am well aware that the more skillful the operator, the more surely will he overcome difficulties, and the more frequently will he have complete operations; but when the conditions which have been named are present, I am confident that it is wiser and better to empty the cystoma and unite the cyst-wall to the abdominal wall, and then drain by means of the ordinary tube. The cyst fluid is usually septic (this is always so in suppurating cysts), and it is very difficult indeed to save the peritonæum and abdominal wounds from contamination. After emptying the cyst and opening it, it should be thoroughly cleaned out with sponges or absorbent cotton, and papillary tissue, if present, may be scraped off. This should be done with the cyst drawn well out of the wound. If the cystoma is large, an effort should be made to separate the cyst-wall from the capsule as far down as possible. If that can be done, the detached portion of the sac is then cut off, leaving it of sufficient length so that the central portion will come up to the abdominal wall without dragging. Bleeding vessels in the cyst-wall are ligated or twisted. The detached portions of the capsule are folded into the cyst and united with a continuous suture, beginning on each side and continuing toward the center, but leaving space enough between their meeting to admit the drainage-tube. In this, great care has to be taken to keep the hands and instruments, which have touched the inside of the cyst, from coming in contact with the peritonæum or abdominal wound. Again, in fastening the partially closed cyst to the abdominal wall, it is necessary to pass the needle from the abdominal wall into the cyst, and not use that needle again unless it is thoroughly cleansed. If, on the contrary, the sutures are passed from the inside of the cyst outward, septic material will surely be carried into the tissues of the abdominal wall, and trouble will follow. One suture on each side of the opening in the cyst for the drainage-tube will suffice to unite the wall of the cyst and the abdominal wall at these points; and one suture above, and one below, carried through the sides of the abdominal wall, and into the cyst-wall, but not through, will complete the coaptation. If this much is accomplished without contaminating the normal tissues, there is very little danger of septic peritonitis occurring, or septic inflammation of the abdominal walls. The drainage is so perfect that, though suppuration in the remaining portion of the cyst may go on, there is not much danger from it if it does not extend outside the sac. The drainage must be long continued, and the convalescence is very slow, comparatively. In case the secreting surface of the cyst has been thoroughly destroyed by suppuration, the recovery is usually not long delayed. Contraction and closure of the cavity come in a month or thereabout. If, on the other hand, the secreting surface is left, the discharge may go on for months; but the patient, meantime, may completely regain her health and be able to attend to her duties comfortably. When a small pocket and sinus remain, it facilitates recovery to inject iodine or carbolic acid. I may be prejudiced in favor of this mode of treating such cases from the fact that I have had two intraligamentous cystomata and four adherent ordinary ovarian cystomata which were treated by drainage, and all recovered.

CHAPTER XXIX.

OVARIOTOMY.

The operation of removing ovarian tumors has been generally known as ovariotomy. Every one understands the meaning of the term, established by usage, as indicating the removal of the ovaries when the subjects of morbid growths. Since Dr. Battey introduced the procedure of removing the normal ovaries the term oöphorectomy has been used more frequently, and there appears to be a disposition among some to use the term ovariotomy when speaking of the removal of ovarian tumors, and oöphorectomy when referring to the removal of the ovaries when not enlarged. This use of two terms which mean exactly the same thing is confusing in any case, but much more so when an attempt is made to make the terms indicate different operations. I shall use the term ovariotomy in all cases when treating of the removal of the ovaries, no matter what their condition may be.

Ovariotomy has in the past been the term used for the operation which includes the removal of the Fallopian tubes with the ovaries. In nearly all the ovarian tumors the Fallopian tube is so united to the neoplasm that removal of the one necessitates the removal of the other.

The operation first practiced by Tait and Hegar of removing the tubes when diseased along with the ovaries, is now quite generally spoken of as removal of the uterine appendages. This is a very unsatisfactory way of expressing the fact. It is absurd to speak of the ovaries and tubes as appendages of the uterus. One might as well speak of hysterectomy as the removal of the ovarian appendage. In the evolution of development the uterus is added to the ovaries and tubes in the higher animals, and ovaries, tubes, and uterus have independent structures and functions; hence, neither one is an appendage to the other. To designate the operation of removing the ovaries and Fallopian tubes, I shall use the term tubo-ovariotomy.

GENERAL CONSIDERATIONS OF OVARIOTOMY.

Before taking up the details of the operation, I shall call attention to certain general facts which belong to all surgical procedures, and have a special bearing on ovariotomy. While most that will be said pertains to the removal of ovarian tumors, it will be equally applicable to the removal of the small-sized diseased ovaries or normal ovaries and tubes, the more modern operation.

I have long entertained the opinion that ovariotomy is the most difficult operation in the whole field of surgery. This is, however, a matter of opinion, and may be an error on my part, but it is positively certain that a thorough knowledge of surgery and all attainable dexterity and skill in operating can be employed with advantage in removing ovarian tumors. This operation differs from all others that I know of, in the number and variety of complications which it affords. It is seldom that two cases exactly alike occur in the practice of any surgeon, hence it is not until a very large number of cases have been seen that the operator is prepared to meet all the conditions which may come before him. To the operator of limited practice, the operation in this respect often presents the characteristics of a new investigation. To this extent, then, the operation is unlike anything else in surgery. Most all other operations are, to a great extent, definite; the anatomy being the same and the *modus operandi* fixed according to well-defined rules. The surgeon has it in his power to learn such operations by practice upon the cadaver, until he may be almost master of his work (if he has in him the surgical diathesis) before touching the living subject. No such opportunity is offered to acquire the art of doing ovariotomy. The division of the abdominal walls, the first and simplest step in the operation, may be studied and practiced upon the cadaver, but here ends the value of dissection as a special aid to the ovariotomist.

Books and lectures, then, are the most available sources of information, but this reading and listening to others talking, although a means of acquiring a knowledge of science, is a poor way of learning how to perform an operation.

It is true that one may familiarize himself with all the steps of an operation and the complications which may be found in each case, and he may be able to recall them at will, and think of them clearly before and after an operation, but to recognize the indications and promptly meet them while operating, can only be learned by practical observation.

The first essential, then, is to know how to operate—a self-evident proposition this, which need not be made here were it not for the fact that many try to perform ovariotomy who are not qualified to do so. It is a notorious fact that this most important of operations has been performed by many who had no claim to being called surgeons. Obstetricians who, having turned their attention to some of the plastic operations of gynecology and succeeded, have next taken to ovariotomy. A few, bolder still, have made their *début* in surgery as ovariotomists, without any previous surgical experience. Why men should be found who will undertake this operation while they would shrink from iridectomy or lithotomy, is a difficult question to answer. Perhaps the difficulties in the way of learning to do this operation may account for it.

It is clearly evident that one should be well grounded in the science and art of surgery before taking up ovariotomy. The consummate surgeon can readily transfer his art to this department of abdominal surgery with far more hope of success than one who seeks to acquire skill by practicing ovariotomy as his maiden effort.

The best and surest way of all to qualify for this operation is to secure facility in general surgery, and then to take lessons of some successful operator; to witness, and if possible to assist in, a sufficient number of operations so as to see the different kinds of cases and the various complications. By such means the surgeon can secure one great element of success, a knowledge of manipulations. Next to knowing how to operate is how to obtain competent assistants. An operator of large experience may be able to do the operation with assistants who know little, if anything, of the operation, his familiarity with the work being such that he can give much of his attention to those who are helping him, and so command success. It is quite different with one of more limited experience. His whole time and attention are taken up with that which he is doing himself, and if his assistants are unacquainted with their duties, they generally hinder rather than help. It is a sad sight to see a beginner, with untrained assistants, trying to do ovariotomy. The ease with which such assistants make simple things complicated and lose time in hurrying is quite extraordinary. I know this from having played the *rôle* of operator and also assistant when I did not know either of the parts.

Skill in diagnosis is a means of success of prime importance, and for many reasons should have been disposed of first; but I put the operation first in my argument simply because I believe that more failures come from poor operating than from errors in diagnosis.

The text-books give all the rules and means of diagnosis so fully that no one needs more theoretical instruction—but here again much practice is needed. Diseases of the ovaries present such variety of physical signs that a very large experience is required to see all the different kinds of cases. Ovarian tumors differ so in their form, composition, and complications in the way of adhesions, that their real nature is difficult to make out. Again, there are many abdominal tumors and products of disease which simulate in their physical signs ovarian tumors so closely, that experts of long practice are at times unable to make a correct diagnosis. Still, great accuracy can be attained in diagnosis by long and careful observation. In many affections we can successfully adapt our treatment to the deranged conditions manifested, although the exact nature of the pathology may be unknown ; but in ovarian tumors we must have rather definite ideas of their character before we can begin their surgical treatment.

Ovariotomy, as an operation, differs so much with the different operators, both as regards the methods of procedure and results obtained, that I propose to notice some of the conditions upon which the success apparently depends.

Dexterity on the part of the operator and all available means which save time and secure accuracy are obvious necessities, and need not be urged in this connection. In an operation of such magnitude the question of anæsthetics requires a passing notice. Sulphuric ether has still the best reputation. Its administration should be prompt and carefully kept up. The less ether that the patient takes the less the danger and the better the condition of the patient afterward. Fifteen or twenty minutes wasted in anæsthetizing give just so much unnecessary blood-poisoning, and this to some extent retards recovery. Giving nitrous-oxide gas first, and following it up with ether, is the most rapid way of anæsthetizing. I have seen this method employed by others with great satisfaction. I use ether altogether, and administer it with the apparatus already described. I believe that the great majority of ovariotomists use this anæsthetic, and I am perfectly satisfied with it when it is given in the way that I have mentioned

There are a number of points of importance which might be discussed in this connection in regard to the different methods which surgeons employ in performing certain steps of the operation. When describing the operation I shall give the methods which in my judgment are the best, but a general discussion of some of these matters appears to be necessary in order to show reasons for my preferences.

In the management of the pedicle, for example, we find that even the renowned operators do not all agree. Through the influence of the most successful of all operators, I am firmly convinced that the cautery gives the best results, and I am also satisfied that it is because the method of using it is not fully understood that it is not more generally employed. The object is to desiccate at least half an inch of the end of the stump and to avoid charring it. This can only be accomplished by strongly compressing the pedicle, using a heavy clamp, with blades half an inch thick, and then heating it with a very heavy cautery until the portion in the grasp of the instrument is thoroughly desiccated. The stump thus treated looks like a piece of translucent horn. The divided ends of the vessels are completely closed, which guards against hæmorrhage. I presume that the end of the stump does not slough, but becomes hydrated, and finally organized.

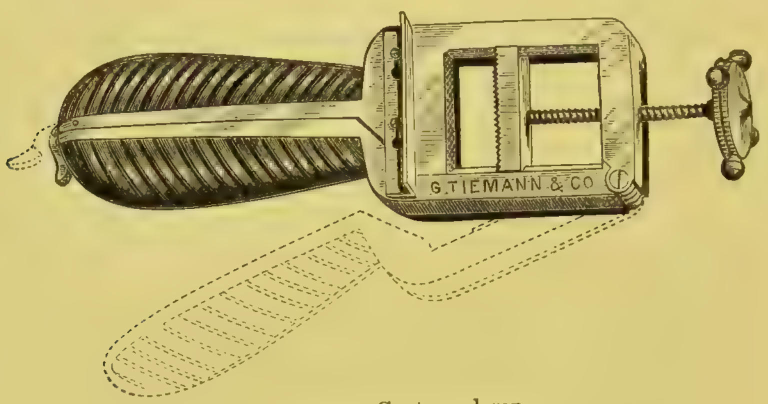

Fig. 222.—Cautery clamp.

The advantages of the cautery may be briefly summarized as follows:

It is a reliable way of controlling hæmorrhage; it leaves the stump in a condition requiring the least reparatory care; and, finally, it avoids all sources of irritation such as that to which the ligature gives rise.

I have recently employed a cautery clamp which, I think, has some merits worthy of notice. It compresses the pedicle on four sides. The long blades keep the tissues from spreading, while the short sliding blade presses the tissues against the other cross-bar. The advantage of this is that the pressure upon the pedicle is equal at all points, and it thereby gives a smaller stump. The trouble with the old straight clamp is, that it spreads out the pedicle too much, and while it firmly holds the central or thickest part, the outer edges are liable to slip out of its grasp.

The next, and perhaps the most important, essential of success is cleanliness, or, to put it technically, the antiseptic method of operating. Surgeons were beginning to feel a certain sense of security in performing ovariotomy when they carried out all the details of the Listerian method; but more recently they have found that carbolic acid in place of saving patients, sometimes sacrifices them. When the danger of carbolic-acid spray in ovariotomy was first announced many surgeons thought that Thomas Keith had given up antiseptic surgery; but that great surgeon is still as earnest and enthusiastic in his war against dirt as he ever was. Although he has given up the use of the spray, because he found that the good that it did was counterbalanced by its injurious effects, he still retains all the other known elements of antiseptic surgery. These elements I understand to be, first, to keep wounds free from extrinsic germs, which are in themselves injurious to living tissues, or which favor morbid action in the tissues; and, on the other hand, to provide for the escape of morbid material which may be developed in wounds. To prevent the entrance of septic germs perfect cleanliness of everything which pertains to the operation is necessary. The carbolic-acid spray can at most only disinfect the air in the operating-room, and consequently it is only one fraction of the antiseptic method of operating. Clean operators and assistants, clean instruments, sponges and everything which may directly or indirectly come in contact with the patient before, during, and after the operation, are all of the highest importance. Still more, it is absolutely necessary to keep all things clean during the operation. A clean, fair start may be made; but during the operation the operator's hands and the instruments may become contaminated by contact with the contents of the cyst, and the patient be exposed to septicæmia. This has often occurred when the spray has been thoroughly and faithfully used. Indeed, if too much dependence is placed upon the spray, there is great danger of contamination from want of care in other respects. Some of the fluid contents of the cyst may enter the abdominal cavity, or the hands of the operator or his assistants may become soiled from the same source, and mischief may be wrought in that way. In short, it is exceedingly difficult to guard against all sources of uncleanliness in this complicated operation. I think, then, that if all the other essential elements of antiseptic surgery are carefully observed, the spray may be left out and still the highest success can be attained. But spray or no spray, too much can not be said in favor of antisepsis in relation to ovariotomy.

There is still another fact which stands out prominently, and upon which success depends, and that is the management of the dead material which may be unavoidably left in the abdominal cavity, or that may accumulate there after the operation. Blood or bloody serum or the contents of the cyst that may be left or may accumulate in the peritoneal cavity is dangerous, and should be removed by drainage.

It is true that within the last year or two there has been some difference of opinion regarding the value of drainage. Some of the great men in London have laid it aside as a rule, while Keith still employs it and insists that he saves many of his patients by it.

I believe that I can see that those who employ drainage have the best of it. I incline to this view because Keith, who practices drainage when necessary, has had the highest number of successes; and because the reasoning against drainage by those who have given it up does not appear to fully harmonize with the facts in the case. It is claimed that if ovariotomy is performed with all the attendant means of antiseptic surgery, including the spray, any fluid which may be left or that may accumulate in the peritoneal cavity is harmless. Spencer Wells states that fluids do not accumulate after the use of antiseptics, or if they do collect they do not putrefy, but are absorbed without injury.

Now it is difficult to understand how antiseptics used in the operation could prevent the accumulation of serum in cases where there were many and extensive adhesions, and, on the other hand, it is equally incomprehensible that carbolic acid in sufficient quantity should remain in the abdominal cavity to disinfect the fluids which transude from broken surfaces. Without daring to decide the matter or to express any positive opinions, I may state that the truth appears to me to be this: Antiseptic operating will lessen the danger to a very great degree, but there will always be cases which call for drainage.

The value of drainage depends largely upon the mode of using it. The method which I have usually seen practiced in this country is to pass a tube through the lower angle of the wound down into the sac of Douglas, and then to close its outer end with a cork. This cork is removed several times a day, and the fluid pumped out. This gives a kind of intermittent drainage which is very imperfect. The method which I obtained from Dr. Keith is much better. In place of closing the end of the tube he passes it through the center of a piece of rubber cloth, and then places a carbolized sponge upon the end of the tube. The rubber cloth is folded over the sponge, and tied securely with a string. The tube and the sponge are thus excluded from the air, and any fluid which accumulates wells up through the tube, and is taken up by the sponge. The sponge is changed several times a day, and any residual fluid which may remain is pumped out at each dressing. In this way continuous drainage is kept up, and still a perfectly antiseptic dressing is maintained. This may appear to be a simple matter, but it constitutes the difference between perfect and imperfect drainage. In a case operated upon last summer, I obtained twelve ounces of fluid in thirty-six hours by this method of drainage, and the temperature of the patient never rose above normal, excepting one day when it reached one hundred, and remained there for a few hours. This case alone would be sufficient to demonstrate both the safety and value of drainage.

In addition to the requisite skill in diagnosticating ovarian tumors, it is highly essential to success to make a correct estimate of the patient's general condition before operating.

Preparatory Treatment for Laparotomy.—One meets not infrequently with urgent cases which must be taken as they are and operated upon at once. The majority of cases, however, can be kept under observation long enough to obtain a clear idea of their characteristics. When the diagnosis of the local condition is made, the general state of the patient should be carefully examined into. The advantage accruing from acting on this principle was recently impressed upon my mind in a case of a large fibro-cystoma of the uterus which required removal While under preparatory treatment the patient's temperature rose to 103½° F., and there was much pain in the abdomen. Septic peritonitis was suspected, but the temperature came down and again went up, showing that the trouble was a zymotic one, and it yielded promptly to the use of quinine. Had I operated without knowing that the patient was disposed to this form of fever, I doubt if she would have recovered as promptly as she did.

The Nervous System.—The state or condition of the nervous system should be investigated, and, if found defective, should be corrected as far as possible. Many patients leave home to be under the care of the special surgeon, and this, together with the dread of the treatment, often deranges the nervous system. All this can be overcome, usually, while other preparatory treatment is instituted. Time should be given for the patient to become accustomed to her surroundings and to gain confidence in the nurse and surgeon. During this time the true state of her nervous system can be ascertained. If she is sleepless and depressed, relief should be given by nerve sedatives and tonics. Quite often the damaged state of the nervous system is due to impaired nutrition, and will be relieved by improving the digestion. Occasionally the nervous trouble is primary, and requires direct attention. Opium in small doses is most reliable in producing sleep and relieving depression, but it deranges digestion and nutrition in some cases, and on that account other remedies should be employed. Sulphonal does remarkably well as a sleep-producer, and is much preferable to bromide, chloral, or any combination of these remedies. It produces the desired result in the great majority of cases that are not kept from sleep by severe pain. This remedy is worthy of note as rather new, and is certainly one that will cause sleep with no other perceptible effect, good or bad.

To restless, anxious patients, who find the days very long even when they sleep at night, and on whom opium does not act well, I have given large doses of lupulin and small doses of cannabis Indica. If these do not answer, opium should be tried.

One of the greatest advantages of this preparatory treatment is that the effect of opium on the case in hand can be observed, so that, if it becomes necessary to use it in the after-treatment, the surgeon knows how far to depend upon it and what effects may be expected.

The Nutritive System.—This requires attention in all patients. In the majority, nutrition is impaired because of derangement of the digestive organs. In others the general nutrition is good, while the digestive organs alone are at fault.

The time during which the trouble calling for surgical treatment has existed makes the difference in the general condition of the patients.

There are two classes of patients usually met in practice who require attention in regard to digestion and general nutrition: First, those who have not been long under the influence of the affection, and need very little treatment, except, perhaps, to relieve constipation and subacute indigestion Such cases are often left without any preparatory treatment save a cathartic the day before the operation. This may be safe enough, but in the majority of cases the tongue is coated, the bowels sluggish, the appetite variable, and the kidneys act imperfectly. These conditions can all be relieved by a few small doses of the mild chloride of mercury, followed by a saline laxative. If this does not clear the tongue, improve the state of the stomach, and increase the action of the kidneys, the treatment should be repeated in a few days. Second, the more advanced cases, in which there is general mal-nutrition as well as impaired digestion. These require more care and for a longer time. It sounds well to say of such patients that the cause being the neoplasm, if this is removed the mal-nutrition will be cured; but the chance of the patient being able to stand the operation may be improved by overcoming the constitutional derangements as far as that is possible. Gastric sedatives, such as bismuth or cerium, may relieve the irritation and improve the appetite, and tonic laxatives, such as nux vomica, belladonna, and rhubarb, will relieve constipation far better than salines.

Management of the Bowels.—The objects in view in the management of the bowels are threefold: First, to clear out the canal; second, to establish as far as possible normal secretion; and, third, to remove the causes of flatulence, whatever they may be. A cathartic should be given two days before the operation. In the choice of a laxative or cathartic, one should be sought which will meet all these indications. In cases showing deranged secretion, indicated by the state of the tongue and appetite, an alterative dose of mercury should precede the cathartic, as already suggested. The mercury, being a reliable disinfectant, will also meet another indication, the relief of flatulence. The selection of a cathartic to be given just before the operation is important. Castor oil is the best in case there is constipation or a suspicion of fæcal impaction. The only difficulty is that many patients strongly object to it. When it can be taken, it should be given two nights before the operation. This gives time for the oil to act, and also gives the bowels a chance to become quiet. The rectum should be washed out the night before the operation or early in the morning. In feeble patients who require a cathartic and yet are not strong enough to stand its operation, I give half an ounce of castor oil and two drachms of oil of turpentine. This is a most valuable preparation, if the stomach will retain it. In fact, this is the only cathartic that will act thoroughly in weak, debilitated patients without causing depression. The dose of turpentine is large, but if less is given it will affect the kidneys and fail as a cathartic to some extent. This may be called a tonic or stimulant and cathartic. A similar effect may be obtained by giving six grains of rhubarb, one grain of compound extract of colocynth, one grain of camphor, and a tenth of a grain of extract of belladonna, in pills. There is a little depression following the action of this, but it is not so certain in its action as oil and turpentine.

To those who can not take either oil or pills without having their stomachs upset, I give one or two teaspoonfuls of calcined magnesia and half a teaspoonful of charcoal, followed in a few minutes with a glass of warm lemonade. This empties the bowels and relieves flatulence very thoroughly. This is given in the morning of the day before the operation, the object being to have the bowels quiet and empty at the time of operating.

The condition of the heart and kidneys should be carefully noticed, especially that of the kidneys. The urine should be thoroughly examined before giving an anæsthetic. I am satisfied that disease of the kidneys is the most important of the contra-indications to the use of anæsthetics. If any renal disease is found, it should be carefully treated and watched, and, if it proves to be acute or subacute, sufficient relief can in time be obtained to warrant the operation; but chloroform might be chosen in place of ether as the anæsthetic, and extra efforts should be made to shorten the time of operating. I have for a long time made it a rule to examine the urine always before giving an anæsthetic, and believe that it should be the invariable practice to do so. I refer to that matter here because I have found many who do not think it necessary.

In regard to the state of the heart, I find that it is often deranged in its function from pressure or indigestion, and it nearly always improves under treatment. When there is time, I order muscular exercise as well as remedies to improve nutrition, and find that much improvement in the heart action follows. Organic heart disease, other than extreme hypertrophy, moderate dilatation, or aortic stenosis or insufficiency, does not deter me from giving an anæsthetic and operating. Many cases having disease of the mitral valve take ether very well.

The day and evening before the operating day call for certain attentions. The bath so generally given the night preceding the operation is not always advisable. If the patient is used to daily or frequent bathing it may be safe to give it, but otherwise it is dangerous. The patient may get cold or become exhausted. The bathing should be done, in such cases, several days before, and then with great care. When there is marked debility, with weak heart, digitalis and nux vomica should be given the preceding day; especially is this necessary when the operation promises to be a bad one. I formerly gave quinine, believing that it was a good tonic and helped to prevent shock, but I am satisfied that digitalis and nux vomica are better. The number of doses should depend upon the effect. As soon as the heart action is noticeably improved the drugs should be withheld.

The food should be of the most nourishing kind, and at the same time easily digested, or else it should be artificially digested. Sterilized or peptonized milk, clear soups, tender beef, mutton, eggs, and raw oysters, either or all of these, according to the preference of the patient, may be used.

The time to operate is, as a general rule, midway between the menstrual periods. An exception should be made in cases of menorrhagia and dysmenorrhœa, in which there is an improvement in the strength toward the period of menstruation. Advantage should be taken of that temporary improvement by operating immediately before the menses.

The morning is by far the best time to operate. The patient is then at her best, and the stomach is empty—a condition very necessary to the taking of an anæsthetic. This would not be referred to here were it not for the fact that a great many surgeons in this country operate late in the day. There are many disadvantages in doing so. The patient suffers from anxious anticipation, and becomes fatigued if food is not given; and if it is given, it is not, as a rule, either digested or absorbed, and the stomach acts badly during and after the anæsthesia under such circumstances.

I am led to dwell a moment on the general therapeutics of abdominal section, for the reason that my attention and that of my assistants has been so fully engrossed with the details of antisepsis and the technique of the operation, that many important items in the general therapeutics have been at times overlooked. It is likely that a similar experience may fall to the lot of others.

There are certain points in the management of the patient during the operation which may be briefly mentioned.

The patient should be kept warm, but the room should be cool, not over 70° F. A very warm room has been advised, and there are many surgeons who still prefer it, believing that there is danger of chilling the patient by exposing the abdominal organs to cool air. This can be obviated in other ways, by keeping the patient's head and feet warm by hot water if need be, and protecting the trunk with rubber cloth. Chilling the peritonæum is avoided by the use of warm sponges. One large sponge should be placed in the wound as soon as the tumor is removed. This prevents the escape of the intestines, and protects the peritonæum from the air. The sponges are maintained at the proper temperature by being kept in a pail which is placed in a larger one filled with hot water. The sponges are thus kept dry, while the water in the chamber around the inner pail keeps up the warmth. In case the operation is a long one, the water surrounding the sponge-pail can be renewed.

Warm ether is also of value in avoiding shock and chilling the patient. This is obtained by using my ether-inhaler, in which the ether is vaporized in a reservoir and conveyed to the patient through a rubber tube. This warms the ether sufficiently to make it agreeable and safe. I have on former occasions spoken of the advantages of this ether-inhaler, by which the anæsthetic can be given pure, or diluted with pure air to any degree, and without the reinspiration of the expired air. I may add here that experience only tends to confirm my confidence in that method of using an anæsthetic such as sulphuric ether.

List of Instruments and Appliances usually required in the Operation.—Scalpel with fixed handle; dissecting-forceps; artery-forceps; six Keith's compression-forceps (Figs. 223 and 224); one vulcellum forceps; one fenestrated forceps; small, straight, blunt-pointed scissors; large, straight scissors; trocar and rubber tube.

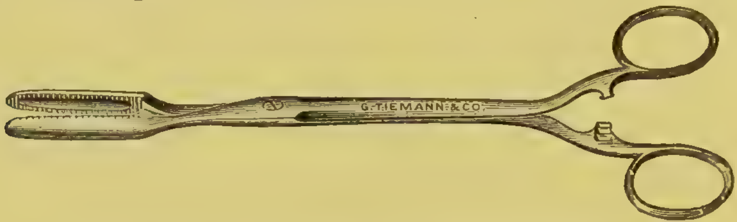

Fig. 223.—Keith's short compression-forceps.

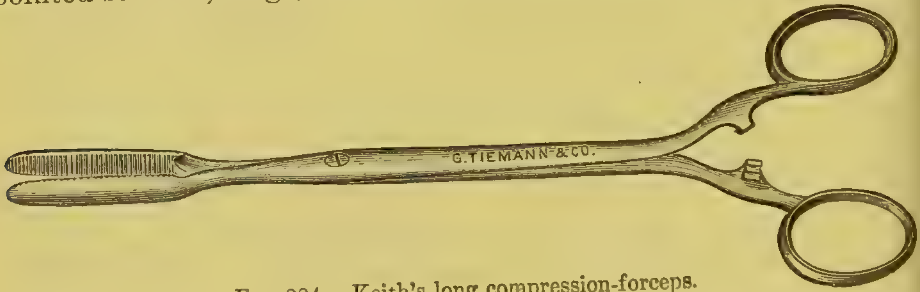

Fig. 224.—Keith's long compression-forceps.

These are placed together in an enameled pan filled half-full with a one-to-forty carbolic-acid solution.

Twelve to twenty sponges, *the exact number to be carefully noted*, prepared and placed in a double tin pail with hot water in the outer compartment; six towels soaked in a one-to-twenty carbolic solution, and put in the sponge pail; No. 1, 3, and 11 prepared silk for ligatures.

These should be cut the proper length for ligating thick adhesions and the pedicle, and wrapped in gauze and put into the carbolic solution.

No. 4 silk for the abdominal sutures should be prepared in the same way; No. 2 catgut ligatures; Keith's needles, two for each abdominal suture (Fig. 225); Peaslee's needles; Keith's fine forceps for carrying the ligatures (Fig. 226) through the pedicle; sutures to be used with Peaslee's needle if required; a sheet of rubber cloth, three by four feet, with an oval hole in the center, the border of which is coated with sticking-plaster an inch wide all around; long straps of saddle-girth to fasten the patient's limbs to the table; a yard of gauze or cheese-cloth soaked in a solution of one part of carbolic acid to eight of glycerin for a dressing; sheet of absorbent cotton large enough to cover the abdomen; flannel bandage; safety-pins.

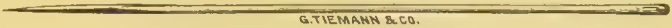

FIG. 225.—Keith's needle.

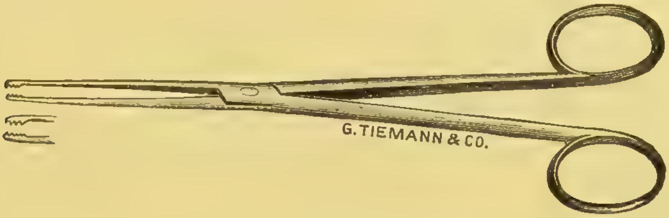

FIG. 226.—Keith's ligature forceps.

Instruments and Appliances that may be needed.—Cautery clamps; cautery irons; Keith's clamp (Fig. 227); curved scissors; concave mirror; counter-pressure instrument for tying ligatures in abdominal cavity; several drainage-tubes of different sizes; piece of sheet-rubber, ten by ten inches, to cover the end of the drainage-tubes; twelve or more extra sponges; twelve to twenty extra compression-forceps; aspirator; elastic ligature.

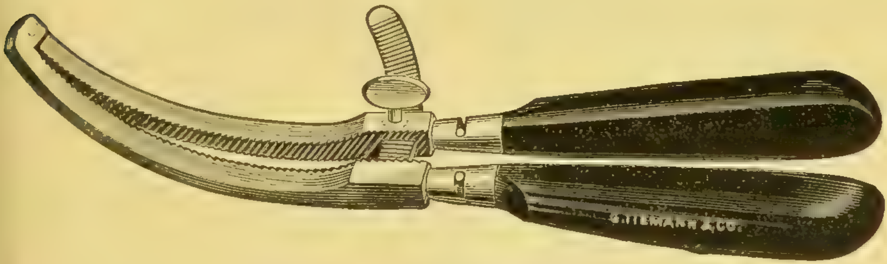

FIG. 227.—Keith's modification of Spencer Well's clamp.

These should be clean and placed within reach of the operator, but not mixed with the other instruments named.

The instruments to be used should be placed on a stand beside the operator, and also a basin with carbolic solution, or such disinfectant as the surgeon chooses to use for keeping the hands clean.

The sponges, ligatures, towels, and dressings may be placed beside the first assistant

Assistants.—Three assistants are certainly needed, and one more may be required. One gives the ether, one stands on the left side of the patient, facing the operator, the third on the left of the operator, and the fourth one attends to the washing of the sponges.

The chief assistant on the opposite side of the table sponges the wound during the incision of the abdominal walls, holds the vessels or adhesions when the operator is ligating them, supports the cyst when brought out, helps to apply the sutures to the wound, and fulfills all orders of the operator. The second assistant supports the abdomen and cyst or tumor while the abdominal walls are being opened, and, when the cyst is being removed, he helps to expel it by pressure, and at the same time prevents the escape of the abdominal viscera.

The assistants carry the patient from the bed to the table. A blanket is wrapped around her limbs, and a rubber bag of hot water placed at her feet. The strap is passed over the thighs and around the table. The abdomen is made bare by opening the dressing-gown and raising the undergarment. The rubber cloth is spread over the

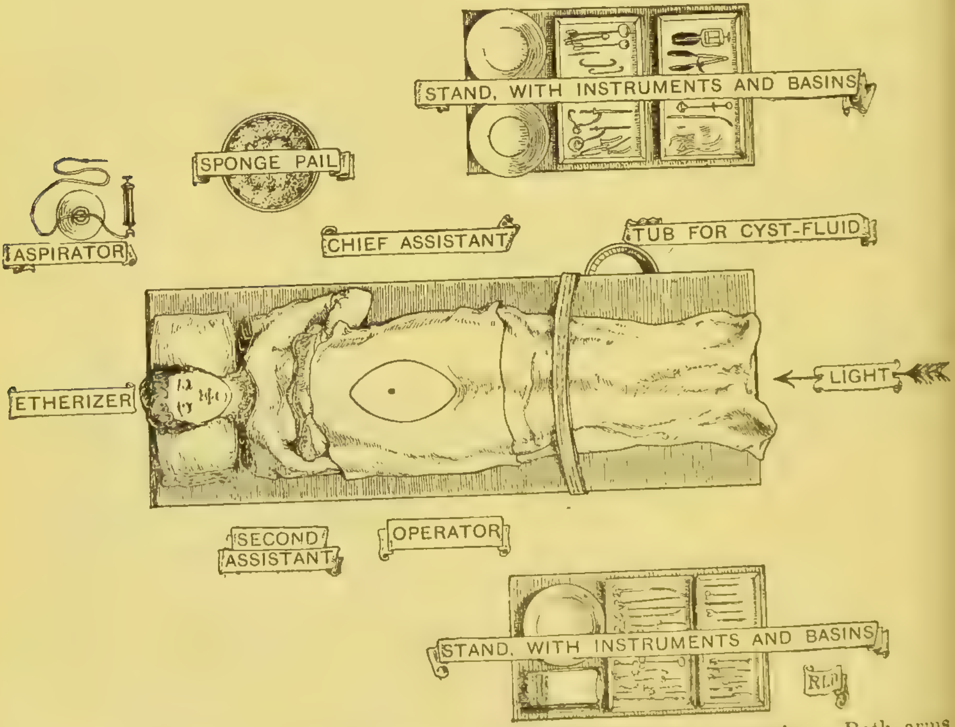

FIG. 228.—Position of operator, assistants and accessories in the operation. Both arms should lie close to the patient's side.

patient, and the edges of the opening in the center stuck fast to the skin around the lower and central portions of the abdomen. One of the carbolized towels is laid over the thighs of the patient, upon which are placed the instruments which are first to be used. This diagram will show at a glance the position of all concerned.

The several steps of the operation are as follows:

1. Making the incision in the abdominal wall.
2. Exploring for adhesions.
3. Tapping the cyst or cysts.
4. Treating adhesions and removing tumor.
5. Treating the pedicle.
6. Examination and treatment of the other ovary.
7. Cleansing the abdominal cavity.
8. Closing the incision.
9. Dressing the abdominal wound and placing the patient in bed.

The details of the several steps in the operation in uncomplicated cases are as follows:

The incision is made in the linea alba—traces of which can usually be seen—down to the muscular layer. The length of the incision should be about three inches, extending from one inch above the pubes upwards. The assistant should follow the knife with the sponge, and any bleeding vessels should be caught up in plain forceps. The tissues at the bottom of the wound should be picked up with a dissecting-forceps, and an opening made in the median line with the knife, the edge of which should be directed away from the tumor. When making this opening care should be taken to find the median line between the muscles. This is often done at the first trial, but, if the muscle is exposed, its sheath should be followed in either direction until the median line is found, and then another opening made there. The knife is then put aside, and one blade of the blunt-pointed scissors is introduced into the opening, and the incision completed by cutting in both directions. This usually extends through the muscular layer; the fascia and the peritonæum still remain. These should be opened in the same manner.

A sound, finger, or the whole hand may be introduced to determine the presence and character of adhesions, if such exist. The trocar and cannula are then plunged into the cyst at the highest end of the incision, the trocar drawn back and handed to the assistant, who takes care that fluid does not enter the abdominal cavity. The cyst-wall should be seized with a lock-forceps between the cannula and left side of the incision. This is also handed to the assistant, who holds it and the trocar in his left hand, and makes the necessary traction to withdraw the cyst, which he grasps with his right hand when it comes out, and holds it without making traction upon the pedicle.

The operator pushes a sponge into the wound behind the tumor. The pedicle is then examined to ascertain its size and character, and whether it be twisted. The cautery clamp (if that method of treating the pedicle is to be practiced) is then applied, and the pedicle divided within half an inch of the clamp. The operator then sponges the abdominal cavity, taking special care not to leave any fluid between the bladder and the uterus. The assistant meantime takes care of the clamp. The operator examines the other ovary, and decides whether it requires to be also removed or not. One or more sponges are left in the abdomen while the pedicle is being treated with the cautery. Two carbolized towels are placed under the clamp, and the remains of the pedicle are removed with the cautery. The clamp is then loosened a very little by unscrewing, and the cautery applied until the clamp is heated throughout to a degree that will admit of the finger being firmly placed upon it. Before finishing the cauterizing, the clamp should be screwed up tight. While the cauterizing is being done, the assistant should remove all fluid and *débris* with a sponge and forceps, and, if the towels beneath the clamp become heated, they should be changed. The clamp should be cooled with a moist sponge without touching the cauterized edge. The pedicle is then seized with two forceps below the clamp, which is gradually and with great care loosened. The stump of the pedicle should be watched for a few seconds to see if the blood inclines to pass up any of the vessels in the part that has been cauterized. If there is no sign of such taking place, then the stump is dropped back and covered with intestines, and the omentum over all. Should the operator decide to ligate in place of using the cautery, the pedicle is secured by two compression-forceps, and a double ligature is passed through the center of the pedicle with a Keith's ligature-forceps, and ligated in two halves. Care should be taken to cross the ligatures, so that when the two are tied they will draw the tissues together in one mass. When the pedicle is small and long, it can be tied before cutting away the cyst, and without using a clamp at all. The sponges should be recounted at this stage of the operation, to make sure that none is left in the abdominal cavity—an accident which has occasionally happened.

A flat sponge is placed over the omentum and beneath the edges of the wound, and left there while the sutures are being introduced. All bleeding vessels in the abdominal wall should be ligated. Two

Keith's needles are used for each suture, one at each end. The needles are introduced from the inside of the abdominal wall, and include the peritonæum. This method of introducing the sutures is the quickest and the best when the incision is long or medium in length, but when the incision is short I prefer to use Peaslee's needle of smaller size than that which is usually found in the shops. The needle is passed from without inward, and the suture is carried through the double of the thread in the needle, and, as the needle is withdrawn, the suture is brought into place. Having introduced all the sutures, the ends on each side are gathered together and held while the flat sponge is removed. The air should be pressed out of the abdominal cavity, and the sutures tied. Slip-knots are preferable. The sutures should be close together, about four to the inch. Here and there a superficial suture may be needed to make the coaptation as complete as it should be. The dressing of gauze, soaked in the one-to-eight solution of glycerin and carbolic acid, is applied, and over that absorbent cotton and a flannel bandage. The patient is put into a warm bed, and hot water-bags or bottles put around her, and one sixth or one quarter of a grain of morphine given hypodermically.

Complications.—The several steps in the operation are liable to be complicated by a variety of conditions. The chief of these may be mentioned in the order in which they come.

When there is much fat beneath the skin it is difficult to make a straight incision. In that condition the wall may be grasped in the left hand, raised up and transfixed with the bistoury and divided from within outward. This leads down at once to the muscular layer, and then the incision is finished in the usual way. Great vascularity of the abdominal wall, while easily managed, takes time. One or two bleeding vessels may be caught in plain forceps and controlled, but when there are many it is better to tie them because a number of compression-forceps are in the way during the operation.

Firm adhesions of the tumor to the abdominal wall in the line of incision are often a troublesome complication, which leads the operator either to open into the sac before knowing it, or else to separate the peritonæum from the abdominal walls. When the tumor can once be reached at any one point, it is very easy to separate the adhesions, but it is often difficult to get that one point. Enlarging the incision is a help, and it should be carried in the direction up or down according to the possibility of reaching a point where the cyst is free. Sometimes the exudation which forms the adhesion can be recognized when it is reached; it is then easy to follow it up until the detachment is complete. When the cyst is exposed all the parietal adhesions should be loosened. This should be done by the hand. When the tumor has been of slow growth and is tense and the walls opparently thick and strong, a very great amount of force can be used in separating adhesions.

If the tumor is flaccid it is well to steady it with a pair of forceps while separating the adhesions and before introducing the trocar.

Parietal adhesions are treated before tapping the cyst, at least as far as they can be easily reached by the hand.

EMPTYING THE TUMOR IN COMPLICATED CASES.

In multiple cyst and multilocular cases in which the contents of the sac can be removed by tapping, the trocar and cannula are thrust into the nearest cyst and it is emptied in the usual way; the trocar is then pushed into another sac, which in turn is emptied, and so on, until all are emptied. To do this safely the tumor should be steadied with the left hand, while the trocar is used with the right, and this helps to make sure that the trocar goes into the sac and not into the viscera or abdominal walls.

When the contents of the tumor are semi-solid and will not flow through the cannula, the trocar and cannula should be removed, and the opening in the sac enlarged in the axis of the body; i. e., the opening should correspond to the opening in the abdominal wall. A pair of forceps should be fastened near each end of the opening on the left side, and perhaps a small one at the lower end on the right side. These forceps are held by the assistant, and as the tumor becomes smaller he draws the sac out and down until the opening in the sac is below the level of the opening in the abdomen. The operator introduces his hand through this large opening into the cyst that is emptied, and breaks down the other cyst-walls and sweeps them out; while the finger of the right hand is boring through the cyst-walls the tumor is steadied with the left hand on the abdominal wall. In this way the contents of large tumors may be broken down and removed. While this is being done the edges of the rubber cloth should be raised so as to direct the fluid into the tub or basin at the side.

When the tumor is very vascular and great bleeding is likely to occur in emptying the contents, the pedicle should be found if possible and compressed with catch-forceps.

Adhesion of the omentum and the abdominal and pelvic viscera is treated after the tumor is emptied of its fluid contents. The omental adhesions are most easily tied while attached to the tumor, and that should be the rule, but if it is necessary to get the omentum out of the way before the operator has time to tie it properly, compression-forceps may be put on, and the whole wrapped up in a carbolized towel, and left on the abdomen at the upper angle of the wound until the cyst is removed, when attention can be given it. It should then be tied in sections of about the width of two fingers.

Dr. Keith treats adhesions to the bowels and mesentery by making traction upon the cyst and pressing against the adhesions with a sponge. In this way the adherent tissues can be pushed apart with less injury than in any other way. Pulling upon adhesions should always be avoided, if possible. Sometimes when there are many adhesions high up strong traction must be made, there being no other way of separating the firm adhesions, but it is a dangerous practice and only to be resorted to when it can not be avoided. Long bands of adhesions should be tied before being detached, and the following points should be observed; to have no tension upon these parts; to ligate as far from the free end as possible, and make sure that all bleeding is stopped before letting go the parts. The bleeding which comes from the broad adherent surfaces which have been separated, should be controlled by placing sponges in the abdomen and making pressure, and as soon as possible bleeding points should be looked for and the vessels ligated. When the sponges are removed the position of the bleeding vessels can be seen. When there are many adhesions high up in the abdomen, it is an advantage to find the pedicle, clamp it with two spring catch-forceps, and divide it, and then remove the tumor from the pelvis first. When the adhesions are all treated and the tumor removed, the sponges which have been introduced should be removed, and the bleeding vessels caught up and tied. During this search for bleeding vessels in the pelvis the assistant holds the side of the abdominal wound with his left hand, and with a concave mirror in his right throws light into the pelvis. In using the mirror the assistant directs it so that he himself can see, knowing that if he can see the operator will see also. The artificial light is to be used as little as possible, because if once begun it is difficult afterward to do without it.

Drainage should be employed when from the number of adhesions there is seen to be a free transudation of serum; when all the bleeding has not been or can not be stopped, and when either of the above conditions are present even in a very limited degree and the patient is feeble. The tube should be left in until the discharge becomes clear.

When adhesions to the intestines or pelvic organs are so firm and extensive that they can not be separated with safety, Dr. T. F. Miner, of Buffalo, enucleates the tumor or cyst from its peritoneal covering. This can be done, but it is often exceedingly difficult, and there is left a large surface from which a free transudation takes place, and requires long-continued drainage. This method is not practiced much now, except in cases of intraligamentous cyst.

When adhesions are very extensive and firm there usually has been inflammation of the cyst, and then its layers can not be separated; this renders enucleation impossible.

Treatment by Drainage answers in such cases if the cyst is small or of medium size. If the cyst is adherent to the abdominal wall it is laid open without being separated and its cavity thoroughly cleaned out, and a drainage-tube introduced, and kept in place. The sac is washed out frequently, and when it has contracted down it may be induced to close by the use of tincture of iodine and carbolic acid. When not adherent to the abdominal wall, but so generally adherent to the viscera that exploration is deemed impossible, the free portion of the sac should be trimmed off and its edges carefully united to the incision in the abdominal wall, and then the drainage practiced.

I am aware that an experienced and dexterous operator can manage very bad adhesions, but there are cases where it is safer to use drainage. Five cases have been treated in this way in my own practice, and four of them recovered. In the fifth, a bad case of ruptured cyst in which there had been very general peritonitis, the cyst was adherent everywhere. I could not find a single free spot, and the patient was very feeble. The sac was filled with inflammatory products, which were carefully cleared out, and large drainage-tubes used. She improved for a time and took food better than she had done before, but died at the end of a week, apparently from uræmia; the kidneys were found to be diseased.

In case of very intimate adhesions to the liver, spleen, uterus, bladder, or intestines, Dr. W. L. Atlee did not detach them at all, but separated the peritoneal from the middle coat of the cyst at the point of attachment, and left it there. This also is not often necessary, but it may be the easiest and safest thing to do, and if drainage is employed good results may be expected. In this I have had no experience.

Arrest of Hæmorrhage.—All adhesions in the form of bands extending from the cyst to other parts should be tied before dividing them. This applies especially to adhesions of the omentum. Large bands should be tied with prepared silk ligatures. The finer bands may be tied with catgut. In my own practice I use silk altogether. Intimate adhesions which have to be separated by traction leave bleeding surfaces, and if any large vessels are found they should be tied if possible. General oozing can usually be stopped by pressure with a sponge. Hæmorrhage deep down in the pelvis from vessels large enough to be ligated can be reached by throwing in the light from the mirror and using a long artery-forceps. The ligature can be easily tied by using the counter-pressure instrument employed in tying the sutures in the operation for restoration of the cervix uteri.

To check oozing from surfaces like the uterus, liver, or spleen, pressure with sponges is to be performed as stated already. An application of persulphate of iron is made by some operators, and the thermo-cautery has also been commended. Both are objectionable, and should be avoided if possible.

After-Treatment.—The bed in which the patient is placed should be warmed to about the normal surface temperature. The patient's head should be covered with a soft woolen shawl or soft blanket. The hands should be kept under the bed-covers and not disturbed. The pulse should be watched at the temporal artery. A hot-water bag may be placed near the feet, but not in contact with them. I have repeatedly seen the feet burned by placing a hot-water bag close to the skin. This will not occur when the bag is wrapped in flannel. The air in the room should be kept at about 70° F., and ventilation secured without having the patient in a draught. For a number of hours ether is thrown off with the expired air, and it is difficult to keep the air in the room agreeable. It is fortunate if the patient sleeps after the operation, and no effort should be made to awaken her, as is frequently done, to find out how she feels.

During the first twenty-four hours or more, the greater the amount of rest that can be obtained the better. Absolutely nothing should be given in the way of food or medicine unless there is some urgent demand for either. Nausea and vomiting, which occasionally occur, should be counteracted with sips of hot water if the patient is anxious to have something to drink—not otherwise.

Keith usually gives a hypodermic dose of morphine immediately after the operation, to control the restlessness which supervenes when the patients come out of the anæsthetic. This is not always necessary. I wait and see if there is much restlessness or pain, and if there is, the hypodermic is given. Nervous restlessness alone can often be controlled by the efforts of a judicious, experienced nurse. If the patient can be controlled until night, it is better to withhold the morphine until then.

This expectant treatment should be continued until the stomach has become reliable and gas has passed from the bowels. In many cases nothing else is required during the first forty-eight hours. I am sure that great harm is done by giving nourishment and medicines when there is no demand for either. I certainly have seen more harm come from doing too much at first than from doing too little. There are exceptions to this rule of doing nothing. In case the vomiting continues, and is not relieved by hot water, I use the following: Magnesiæ carb., ʒ ij; magnesiæ sulph., ʒ iij; aquæ menth. pip., ℥ iij. Of this, a teaspoonful may be given every one, two, or three hours in a dessertspoonful of water. This prescription is used in the Samaritan Hospital in London. A mustard plaster to the pit of the stomach is also useful.

When these remedies fail, and the patient complains of burning in the stomach, dessertspoonful doses of iced water may be used. When the patient is depressed, ten drops of whisky in a teaspoonful of water every few minutes will be of service. In desperate cases I have given a large quantity, as much as the patient could drink, of lukewarm water and a little table salt. This is thrown off promptly, and sometimes gives relief. It should not be repeated. If relief is obtained and the nausea returns, the stomach should be washed out in the usual way.

When the vomiting is attended with abdominal pain, morphine hypodermically will give relief in many cases.

Peritonitis and Septicæmia after Laparotomy.—From recent reports in the literature of medicine it appears that a new departure has been taken in the after-treatment of cases of ovariotomy and similar operations. In place of giving opium and keeping the bowels at rest for several days, the bowels are moved early, and opium is withheld. Cases which show signs of septicæmia or peritonitis are given saline cathartics. It is claimed that free action of the bowels effects a kind of drainage which arrests the tendency to inflammation of the peritonæum, and also favors the elimination of septic material. One should gladly accept whatever theories or facts may be advanced in favor of this plan of treatment, or any other which might prove better than the old ways of managing such cases. But I have failed to see that this new treatment has many advantages.

So far as I can learn, the results, on the whole, do not compare well with those of other surgeons who give opium and let the bowels and the stomach rest, until the first dangers are past. Furthermore, I have found in my own practice that as soon as the indications for cathartics appear, it is impossible to have the patient retain them, in the great majority of cases.

Perhaps the advocates of this treatment may be able to anticipate the coming storm, and, by giving salines, ward it off; but I have not been able to do so.

While there are a number of reasons why opium should be used, I have not yet heard of any good reason why it should not be, in certain cases.

That there are patients who do not need opium, and others with whom it does not agree, must be admitted; but the majority require it to relieve pain, produce sleep, and, above all, rest and quiet, which are so very necessary to recovery after major operations. These effects of opium, it may be claimed, simply contribute to the comfort of the patient, but do not secure safety or aid in recovery. Granting that such may be the case, the humane surgeon will find in this good reason for the use of opium; but I am confident that opium has a therapeutic value in addition to that of relieving suffering.

The danger from shock which arises from major operations is, I am sure, controlled by opium better than by any other drug. So also is the depression from anæmia resulting from hæmorrhage. All careful observers have noticed that the rapid and feeble pulse becomes fuller, slower, and steadier under the influence of opium. The anxious, pinched face also changes to a better expression. This has led me to look upon opium as the most reliable of all heart tonics in the depression which follows these operations. When the organic nervous system is tottering under the oppression of severe injuries to the abdominal and pelvic viscera, opium is the greatest sustaining agent. Alcohol, no doubt, will bridge over a moment of extreme and immediate danger, but its effects must almost always be supplemented with opium in order to obtain a continuous sustaining effect.

Perhaps more important still is the question, Does opium have the power of preventing peritonitis and septicæmia, or of controlling their fatal tendencies? To judge fairly of the therapeutic effects of opium in surgery, it is necessary to keep in mind the fact that after an operation there are injured tissues left that must be repaired. These tissues may or may not be affected with septic material, but in either case the safety of the patient depends upon these wounded tissues being speedily closed in by reparative material, which restores continuity of tissue and at the same time protects the normal surrounding tissue from inflammation and the patient from general septicæmia. Now this process, by which the general system is protected from the dangerous effects of local injuries, requires time; and it is the most important time, because upon completion of this protection depends the safety of the patient to a great extent. Wounds may do badly, but, if an exudation has been thrown around them which protects from septicæmia, recovery may be expected Of course, the modern surgeon protects his cases from sepsis by his cleanly operating; but in spite of his best efforts there may be trouble occasionally, and then the great point is to gain time for this natural protective process, which comes, or should come, first in the order of restoration. The principal condition necessary to secure the protective factor in the general process of repair is repose or quietude of the nervous and circulatory systems, and opium is the most potential agent in effecting this condition. The process of repair is arrested when the nervous system is in turmoil and the circulation is running wild, and opium should be used to give the necessary rest. It is a fatal mistake to wait until there is evidence of inflammation or septicæmia. It should be given to control the nervous excitation which generally precedes these complications.

The time to give it, then, is an important question. Some of the most successful surgeons give it immediately after the operation, and that is best when the case is bad and there is shock. In easy cases I prefer to wait until the ether effects pass off to some extent; and if there is distress or pain present, then is the time to give opium, and the effect should be kept up until there is no danger of complications, so far as the condition of the patient indicates.

The way of giving it is of some importance, no doubt. I prefer to give it at first hypodermically, and keep up the effect in that way, or by rectal instillations of opium and warm water.

The question which follows is, When shall the opium be withdrawn, and cathartics resorted to? Opium should be gradually given up as the constitutional and local evidences of disease subside, and then cathartics or laxatives should be given. To state this in another way: opium should only be given when there are indications for its use, and it should be given up as soon as the indications disappear. The bowels should rest until the time for peritonitis is past, or, if there has been inflammation or sepsis, when the acute symptoms and signs of these have subsided.

CHAPTER XXX.

ILLUSTRATIVE CASES OF OVARIAN NEOPLASMS.

In giving the histories of ovarian neoplasms it has been deemed best to omit simple and typical cases, because they would add nothing to the description already given. The following complicated ones, on the other hand, will tend to convey clearer ideas of the peculiar cases which are frequently met in practice, and the approved methods of management adopted at the present time.

Monocyst of the Right Ovary; Firm Adhesions to the Abdominal Wall; Necrosis of the Posterior Wall of the Cyst; Ovariotomy; Recovery.—The patient was fifty-four years old, and the mother of four children. After the birth of her last child, the attending physician told her that she had a small tumor on the right side of the uterus. There was considerable intermittent pain in the region of the neoplasm from the time that it was first discovered up to the time that she came under the care of my associate, Dr. Palmer, four years afterward. The growth of the tumor was slow, scarcely noticeable for the first three years, but very noticeable during the last year.

When she first came under the care of Dr. Palmer the tumor extended above the umbilicus, and fluctuation was well marked. There was evidence of circumscribed peritonitis, and, although the tumor was movable, adhesions were being formed. The peritonitis was quite pronounced at this time, and the constitutional symptoms were well defined. She was treated for this, and in about two weeks the acute symptoms subsided, but she still remained weak. The doctor sent her home in the hope that she would gain strength, and the tumor being still small there was no urgent necessity for its removal. In a month she returned to the hospital not improved. She was losing flesh, the parts were still tender, the appetite poor, the pulse weak, and the temperature kept above 100° F.

Another effort was made to get her into better general condition, but without success. She lost strength gradually, and it was decided that the only chance for her was by removing the tumor. At this time the adhesions were firm and involved all parts of the abdominal wall which were in contact with the tumor.

Just before the operation the pulse was 120 and the temperature 101°. When the abdominal incision was made, the adhesions were very firm and vascular, except in a small space just above the symphisis pubis. The cyst was emptied by tapping, and the lower portion, which was not adherent, was drawn out, and the pedicle grasped with strong fixation forceps, and divided. The adhesions were now easily reached and separated. The pedicle was then ligated, and the bleeding stopped by pressure with sponges. By managing the pedicle in this way, the tendency to bleeding from the site of adhesions was lessened very decidedly. When all bleeding had stopped the wound was closed and dressed in the usual way.

An examination of the cyst showed a portion of its posterior wall (about the size of one's hand) perfectly bloodless, of a dirty gray color and friable, indicating that it was necrosed. No doubt the death of this portion of the sac had taken place many days before the operation, and I presume was the cause of the constitutional disturbance.

From the facts in this case and from those observed in other cases of necrosis of the cyst-wall, I believe that the dead tissue causes a form of septicæmia, certainly in this case there was nothing else found to cause the high temperature and pulse, and the subsequent history confirms this view.

The operation was performed between eleven and twelve o'clock. She soon recovered from the ether, and showed no depression. At seven in the evening her condition was better than before the operation. The pulse was 112, temperature 99·5° F. and respiration 20. During the night she had slight pain in the abdomen and was given a hypodermic injection of morphine. She slept well, and had no vomiting. On the second day there was some slight distention of the abdomen from gas; this was relieved by six grains of sulphate of quinia in solution, given by the rectum.

From this time onward her progress was very satisfactory. The temperature never rose above 99° F. Five days after the operation the bowels were moved by enema. On the twelfth day she left her bed, and four days later was able to walk about the ward. About four weeks after the operation the left leg became swollen, and remained so for about a week. The cause of this was not certain.

She was discharged from the hospital at the end of the fifth week feeling perfectly well and having gained flesh and strength surprisingly.

Intraligamentous Ovarian Cystoma; Multiple Cyst of the other Ovary; Ovariotomy and Hysterectomy; Recovery.—This patient was under the care of my friend Dr. F. H. Stuart, and most of the facts in the history of the case—before and after the operation—are given here as I obtained them from him.

The lady was fifty-six years of age, and had passed the menopause about six years. At the age of thirty-nine years she had a pelvic abscess which opened into the bladder, and she was then sick for a long time. About three years before the time when this history was taken she noticed a tumor in the right iliac region.

She was first seen by Dr. Stuart, April 30, 1886. He found the uterus high up behind the symphysis, attached to an elastic tumor, which was immovable, and by external examination appeared to be larger than a fetal head and extending up into the right iliac fossa. There were two other tumors of smaller size, one above and one to the left of the larger one. These appeared to be adherent to the first one, and were also rather immovable. I saw the patient the next day with the doctor, and confirmed the diagnosis of ovarian cysts. On account of the adhesions, and as the patient was not suffering any great inconvenience, we thought it best to await further developments.

She passed a very comfortable summer, but increased steadily in size, with a corresponding increasing discomfort in locomotion. About the 1st of December, 1886, she began to have frequent and painful urination, and some fever. After a few days of quiet and some quinine (as there was a decided intermittence in the irritability of the bladder), she became again quite comfortable.

Immediately before the operation the physical signs were as follows: The general outlines of the enlarged abdomen were irregular, three cysts could be mapped out, and fluctuation was distinct in each. The most dependent cyst was about the size of the uterus at the seventh month of utero-gestation, and occupied the center and lower region of the abdomen. It was not movable to any extent, and appeared to be separated from the other cysts except at the upper and right side, where it seemed to be adherent but not firmly so. The two other cysts occupied the upper and left lower regions of the abdomen, raising the diaphragm and causing the lower ribs to project slightly. These two cysts could be moved together in the abdomen, but were closely united forming one tumor. The fluctuation was very clear in each of them, but was not distinctly felt through the mass formed by the two.

All around the circumference of the abdomen there was dullness on percussion, and distinct fluctuation, though broken at points where the divisions between the cysts were. These signs simply indicated the presence of a multiple cystic tumor. The umbilicus was high up, showing that the lower portion of the abdominal muscles was distended most, and in a space about five inches in diameter in the umbilical region there was tympanitic resonance and gurgling on pressure, showing the presence of intestines at that point. Taken altogether the abdomen appeared to be occupied by a large cystic tumor with a mass of intestines in a cup-shaped space in its center.

By vaginal touch the uterus was found displaced upward and forward, and the cervix could be reached without difficulty, owing to its being crowded toward the pubes. Behind the uterus and extending down into the upper and posterior portion of the pelvis a segment of cyst was found. The uterus was displaced by moving the cyst in front, and pushed forward by raising the cyst behind it. The examination indicated very certainly that there was a cystic ovarian tumor of the multiple variety, but there was evidently more than that. The fact that the uterus was involved raised the question of uterine fibro-cyst, as well as ovarian tumor, but there was some doubt about the nature of the whole mass. It was possible that the uterus was simply adherent to the cystic tumor, and that the adhesions had been formed while the tumor was still in the pelvis, and the uterus had been carried upward as the tumor grew. It also was presumed that there might be two cystic tumors, and that the uterus was attached to one of these.

While the exact pathological conditions were not decided upon, two facts were quite evident; first, that there was at least an ovarian tumor, and that the patient must obtain relief, if at all, by ovariotomy.

Operation.—After making the abdominal incision, the first cyst was exposed, and adhesions of the omentum were found on the right side. The omentum was vascular and its adhesions covered the upper part of the tumor. After emptying the cyst by tapping, the omental adhesions were ligated and separated, and it was then found that this cyst had no connection with the cysts above, but was situated between the folds of the broad ligaments, and extended from one side of the pelvis to the other, between the uterus and the bladder. The uterus, being behind the cyst-wall and firmly attached to it, had been stretched laterally so that its long diameter was transverse. The empty cyst was held outside of the abdominal wound at this stage of the operation by forceps, and the incision extended upward so that I could reach the other tumor, which I found to be a multiple cyst of the left ovary.

The four largest cysts were tapped separately, first the one on the right side, and next the one above and to the left, then the one that dipped down behind the cyst of the broad ligament and uterus, and lastly a middle one between the upper and lower cysts. There was a deep fissure between the two cysts on the left side through which the intestines found their way up to the abdominal wall, which accounted for the tympanitic resonance obtained during the examination. This tumor had an ordinary pedicle starting from the left posterior surface of the broad ligament, which was ligated with silk, and the tumor removed.

Having disposed of this tumor, I returned to the cyst of the broad ligaments, and upon laying it open and inspecting its cavity, I found at the bottom of it a papillomatous mass which had the appearance of an epithelioma.

I then undertook to enucleate this cyst, the lower portion of which was fixed in the broad ligaments, between the bladder and uterus, as already stated, but the adhesions were so firm and the vascularity so great, that this was impossible. I then tried to enucleate the inner wall of the cyst, but this was also impracticable. The thought occurred to me that I might stitch the cyst-walls to the sides of the incision in the abdominal walls, but as the cyst dipped down into the broad ligaments on both sides, two pockets would have been left, which would have been difficult to drain. The papillomatous mass in the central part of the sac would have been left also, and that, I presumed, would have interfered with the closure of the sac, and the final recovery of the patient.

It seemed as if the whole thing should be removed, but I could not take in all the tissue involved in any ordinary clamp.

I then tied and divided the broad ligament on both sides from the outside toward the center, so as to form a pedicle which could be grasped in the clamp. The bladder was dissected from the cyst-wall far enough to let the clamp get down below the uterus and the most dependent portion of the sac. Keith's modification of Baker Brown's clamp was then applied, and the cyst and uterus removed.

A drainage-tube was introduced above the clamp, and the abdominal wound closed from above downward.

The operation was completed at noon, and five minims of Magendie's solution of morphine were given hypodermically at once. She slept quietly for about two hours and then had some nausea, and vomited a mouthful of mucus. The remainder of the day was passed comfortably, the catheter was used, and sips of hot water were given. At midnight the temperature was 99⅖° and pulse 86. The second day was without much to note except that the temperature went up to 101⅖° but, toward midnight, it came down to 100° and the pulse was 86. There was some distention of the bowels which was relieved by quinine, given by the rectum. From this onward the patient did very well, the pulse was good and temperature ranged from 99° to 100°. She required morphine to keep her comfortable, but nothing more.

After the operation the kidneys acted very well, the catheter being used for two days, and after that the patient urinated without trouble and passed the usual quantity of water. On the tenth day, while urinating, the dressing of the wound became saturated with urine, showing that the upper part of the bladder had opened; the dressings were removed, but the opening was covered by the clamp and could not be seen. Several times afterward when she urinated she passed a very small quantity of water by the urethra, the larger portion passing by the side of the clamp. Between the times when she urinated there was no leaking from the opening in the bladder. She was not permitted to urinate after this; the catheter being used at regular intervals.

For two days very little urine escaped from the opening, and then a little began to come, which made the wound unclean.

It being quite evident that the stump, below the clamp, had undergone necrosis to a considerable extent, an elastic ligature was passed around the stump, below the clamp, in the hope that it would cut its way through the softened and dead tissues, and set the clamp at liberty; it did so to a limited extent only, and, as it was very difficult to keep the wound clean, the clamp, on the fifteenth day after the operation, was carefully liberated by dividing the dead tissues of the stump with the knife and scissors. No hæmorrhage was caused.

When the clamp was removed, it was found that the necrosis of the tissue extended farthest on the right side, and it was at this point where the bladder was open. At first it was thought that the bladder had been included in the clamp; but that did not seem possible, because of the extreme care taken to avoid it when applying the clamp, and also from the entire absence of all functional disturbance of the bladder during the ten days immediately succeeding the operation.

After removing the clamp, and seeing how far the death of the tissues of the stump had extended on the right side, it appeared that the opening of the bladder was due to this destruction of the tissues. The opening occurred on the right (as has been already stated), at the site of the old cellulitis, which she had years ago, and where the abscess discharged into the bladder, in all probability, and this may account for the death of the tissue below the clamp.

During the operation it was noticed that the right broad ligament was thickened greatly, and changed in appearance, owing no doubt to the products of the old inflammation, and the damaged state of the tissue probably favored the necrosis; this may have been also favored by the pressure of the abdominal wall. The pedicle was broad, so that it stretched the wound, and the pressure of the strongly retracted edges of the wound may have helped to strangulate the right side of the stump, the vitality of which was of a low order.

The dressing of the stump and abdominal wound now became a rather difficult task, owing to the escape of urine. Iodoform and absorbent cotton did best of all. Although the catheter was used, there still was some leaking above. The urethra became tender to the passing of the catheter, and then the doctor tried keeping it in the bladder continuously. This did well for a time, but had to be given up because of the pain caused. By the free use of cocaine the catheter could be used, so that the leaking in the wound was not great. During all this time her general condition was fairly good, but the wound healed slowly, and she needed morphine to keep her comfortable.

About this time several of the ligatures used in tying the broad ligament on the right side came away through the wound. About five weeks after the operation, and while she was apparently well, except that the fistulous opening of the bladder remained and her strength had not returned fully, she was taken quite ill; the temperature ran up to 103°, and the bowels became constipated; the appetite was entirely lost, and she looked badly in the face, and lost flesh rapidly.

There was a hard, irregular mass felt in the right side of the abdomen at this time, which was presumed to be a local inflammation due to the ligatures used in ligating the omentum. The doctor and I were not without some fears that it might be the beginning of some malignant disease, but it proved not to be so. Quinine given by inunction and the rectum controlled the fever after a time, and then the stomach and bowels began to act again.

From this time her progress was favorable, and she is now (one year after the operation) perfectly well.

A Papillomatous Monocyst of the Ovary. Ovariotomy. Fatal Termination from Hæmorrhage.—The patient was thirty-five years old. She had had two children. For about one year before the ovarian tumor was detected she suffered from menorrhagia. When I first saw her she was quite anæmic from long-continued and profuse menstruation, caused by polypoid fungosities of the uterine mucosa. She was promptly relieved by curetting. At that time the ovarian cyst was about the size of a pregnant uterus at four and a half months. The cyst increased in size rather slowly. She had two attacks of circumscribed peritonitis, one at the upper part of the cyst, which gave rise to adhesions to the abdominal wall above and to the left of the umbilicus. About eight months from the time that I first saw her, and after the slight attacks of peritonitis, she was attacked with severe pain in the region of the cyst, but there was no evidence of inflammation.

At this time the cyst became very tense, and there was general tenderness and heavy pressure. These symptoms subsided for a time, but there were several attacks of this kind, each one being marked by a sudden increase in the tension of the cyst. The patient continued to be rather anæmic, there were wandering, ill-defined pains in the abdomen, and the general condition showed that she suffered more than is usual in cases of uncomplicated ovarian cystoma.

This led to the determination to operate, though the size of the cyst did not demand immediate interference.

When the wall of the abdomen was opened, and the cyst exposed, it was darker in color than it should be; adhesions were found at the upper and left side, and also low down and near the median line. Tapping was tried, but the contents of the cyst would not flow. The sac was then opened, and its contents were found to be blood and old blood-clots with very little ordinary ovarian fluid. It was necessary to pass the hand into the cyst to evacuate its contents; this caused fresh and profuse bleeding. The patient showed the loss of blood very rapidly; great haste was made to separate the adhesions, which were very vascular and required ligating.

The depression became more and more marked, and it looked as if the patient would die on the table. The cyst was hurriedly removed, and the abdominal wall was closed. There was some oozing from the adhesions, and, as there was little time for sponging the peritoneal cavity and stopping the bleeding, which was only a very little oozing, a drainage-tube was used. The patient rallied a little, and there were hopes that she might be saved. There was considerable discharge of bloody serum from the tube, which, in place of becoming less, as I expected it would, increased. Whenever the pulse improved, and the patient gained a little strength, the bleeding increased. It was never free enough to warrant my opening the abdomen to stop it, but kept on just enough to keep the patient down. At the end of the third day there was very little bleeding, and there was a promise of success, but then she began to show signs of heart-clot, and she died on the fourth day.

The inside of the cyst was lined with a layer of papillomatous material, which presented a cauliflower appearance not unlike that of epithelioma of the cervix uteri.

The points of greatest interest in the history of this case are the frequent hæmorrhages which took place in the cyst during its growth and the unsatisfactory character of the operation which permitted the loss of so much blood. There is no doubt in my mind but that the attacks of distress and extreme and sudden distention of the sac were due to the hæmorrhages in the cyst. This view of the matter was confirmed by the large number of blood-clots which were found during the operation. The evidence of these extra cystic hæmorrhages was so marked and peculiar that I am sure a diagnosis could be made with certainty in similar cases. This would be a great gain, because it would enable one to operate before the frequent losses of blood had weakened the patient, and while the cyst was small, and could be more easily removed—two advantages which would tend to the safety of the patient.

There were several unfortunate incidents in the operation which could have been in part prevented had I had more experience in such cases. In the first place, when the patient was anæsthetized, the cyst was handled with considerable force for the purpose of determining the presence and extent of the adhesions. This, I am sure, started the bleeding, which might have been avoided. When the cyst was opened, and the active hæmorrhage detected, I should have found the pedicle, and temporarily controlled it with compression-forceps. This would have saved much of the hæmorrhage, and then I could have taken time to treat the adhesions properly.

These facts, I believe, explain fully the failure in the case, and they throw much valuable light on the diagnosis and treatment of this peculiar variety of ovarian neoplasm.

Ovarian Cyst between the Folds of the Broad Ligament. Incomplete Removal of the Cyst; the Remaining Portion treated with Drainage; Recovery.—This lady was thirty-five years old, and had been married nineteen years. Her general health had been fairly good, but she did not menstruate until she was nineteen years of age. The menstrual flow had always been scanty and of short duration, and she never had been pregnant.

These facts indicated that probably the sexual organs were imperfectly developed. About one year before she came under my care she noticed a small tumor in the right side of the abdomen, low down. It steadily increased in size, and then she lost flesh and strength, and suffered from pain in the abdomen and back, and her appetite failed. When first seen by me she had a bronzed appearance, was feverish, and the pulse was fast and rather weak. She had the general appearance of one in the last stage of ovarian dropsy, and also cachectic. The tumor was about the size of the uterus at the seventh month of pregnancy. It was very hard, and fluctuation was very indistinct. Though not apparently adherent to the abdominal wall the tumor was not at all movable. It was firmly fixed in the pelvis, and there was much tenderness.

By the vaginal touch the hard tumor was found deep down in the pelvis, firmly fixed, and not the slightest fluctuation or elasticity could be detected. The uterus was pushed to the left and upward, so that it partly occupied the left iliac fossa. The irregularity of the surface of the tumor, as felt through the vagina, indicated that it was surrounded by the products of inflammation.

The physical signs, as observed by the vaginal touch, were such as would indicate a uterine fibroid developed in the right broad ligament, but the character of the tumor, as felt in the abdomen, showed that it was a cyst. The question of fibro-cyst was then raised, but the history of the case was not in favor of this. While there was little doubt regarding the true nature of the tumor I favored the diagnosis of ovarian cyst complicated by inflammation of the cyst-walls.

The patient was placed under treatment in the hope of improving her digestion and general health, but beyond relieving her constipation and flatulence there was no real gain. Her pulse remained about 98, and her temperature fluctuated between 99° and 101°. During the few days that she was under observation the cyst became a little less tense so that fluctuation could be more surely made out.

The chief points of interest in the operation were as follows. The tumor, easily and fully exposed by an incision three inches long through the abdominal walls, was adherent to the omentum over its entire anterior surface. The cyst was emptied by aspiration of its contents which contained pus and lymph. The omentum was ligated in sections with silk, and detached from the cyst-wall. It was then found that the folds of the broad ligament covered the cyst completely, and were so intimately blended with the walls of the cyst that they could not be separated to any extent. Careful and persistent efforts were made to enucleate the cyst, but in vain. The opening in the cyst was temporarily closed with forceps, and the left ovary looked for. It was found far over on the left side and contained several small cysts. It was removed in the usual way. The major portion of the cyst-walls and broad ligament was then removed, and the larger vessels ligated to control hemorrhage. Another effort was made to enucleate the remainder of the cyst-walls, but they extended so deep down into the pelvis and the tissues were so exceedingly vascular and matted together by inflammatory products that it could not be done. The remains of the ligament and cyst-walls were carefully stitched to the abdominal wound, the sac carefully sponged clean, and a large drainage tube introduced.

The after-treatment and progress of the case were as follows: She had for the first two days considerable nausea and pain. For this she was given hypodermic injections of morphine. The sac was washed out thoroughly every four or eight hours according to her temperature. There was not much nourishment taken during the first six days. The pulse and temperature varied greatly. The pulse kept above one hundred most of the time, and the temperature fluctuated between 100° and 102° and occasionally 103°, but this high temperature never lasted long at a time.

During the first ten days the morphine was required, and stimulants had to be used. In spite of the frequent washing out of the sac and free drainage there was some blood-poisoning. Quinine was freely given (whenever the temperature went up) by the rectum and by inunction. From the twelfth day onward there was not much of interest. The patient's nutrition was poor, the pulse and temperature kept a little above normal, and occasionally the temperature rose to 101°, rarely to 102°. The sac cavity gradually diminished, and the discharge became less. At the end of the third week the temperature was normal and remained so afterward. She took food well, and began to gain strength and flesh. The cavity was very small, and the drainage-tube used was a piece of a No. 10 elastic catheter. The wound had completely healed, except where the tube was in place, at the end of the fourth week.

Five weeks after the operation, and when the patient was up and apparently about well, there came a swelling quite hard at the side of the sinus, and the temperature went up to 102°. It was suspected that an abscess was forming there, and in the hope of reaching it, if suppuration occurred, the opening was enlarged, and a tube of greater caliber introduced, but the swelling entirely subsided and the tube was removed.

The patient was discharged in good condition two months after the operation.

A Medium-sized Ovarian Cyst which could not be removed owing to the Character of the Adhesions; treated by Drainage; Recovery.—The patient, a German lady, thirty-four years of age, was admitted to the hospital, and gave the following history: She had had several children and had noticed a "lump" in the abdomen about one year before my first examination. This gradually but slowly increased, and at times there was pain but not severe, until about four months after she discovered the tumor. At that time she was seized with violent pain in the abdomen, especially on the right side. According to the history she evidently had at that time a severe inflammation. This slowly subsided under the care of her family physician, but she did not regain her health, and continued to lose flesh, her bowels were constipated, and there was much pain and tenderness in the region of the tumor. The size of the tumor increased, and it was much more prominent on the right side.

At my first examination, I found the tumor firmly fixed on the right side, the adhesions to the abdominal walls and viscera being evident at all points, especially high up in the lumbar region on the right side. The fluctuation though not clear, was sufficiently so to indicate that the tumor was a monocyst.

Her general condition was very poor, she was greatly emaciated, her skin was bronzed, and she had the general appearance of one suffering from malignant disease. Her pulse was feeble, and her temperature varied between 98° and 100°. She had pain and tenderness in the abdomen, especially on moving.

Efforts were made to improve the general health, but without effect. The points of special interest in the surgical treatment were the following: The abdominal wall at the point of incision was very vascular, and the adhesions were also thick and vascular, and were with difficulty separated from the cyst-wall. On tapping the sac it was found that the contents contained lymph and some pus, showing that there had been inflammation of the interior wall of the cyst. On the left side the abdominal wall was separated sufficiently to enable me to pass my fingers into the peritoneal cavity, and there I found the intestines adherent to the cyst-wall. I tried first to separate the adhesions but that could only be done by dissection, and the bleeding was such that I had to abandon that procedure. I then tried to dissect the peritonæum off from the cyst-wall and leave it attached to the intestines, but this was impossible. In a dissection about an inch long and half an inch in width I had to use three ligatures to stop the bleeding. I also found that every portion of the sac was fastened in by strong and vascular adhesions which I knew I could not separate without losing my feeble patient. The fact is I could not remove any considerable portion of the sac, only a very small portion in front. I thoroughly cleaned out the sac, and stitched the edges to the abdominal wall. This was easily done because the cyst was adherent all round to the abdominal wall, except on the left side. A large drainage-tube was introduced and the sac washed out with carbolized water twice or three times a day.

The patient did well. She began to gain soon after the operation, and continued to increase in strength slowly, but without interruption; at the end of two weeks after the operation the sac had contracted very much, and there was considerable suppuration. The long tube was removed, and a shorter one was used to maintain the opening in the abdominal wall. The thorough washing out was kept up, and about five times in all I distended the sac with equal parts of carbolic acid and tincture of iodine. This destroys the secreting surface of the sac, suppuration followed, and the sac contracted gradually. At the end of two months there was little more left than a solid mass with a narrow and not very deep sinus in it. The patient was sent home, and directed to wash out the sinus daily.

She was not seen again until five years after, when she returned to the hospital to see my associate Dr. Palmer. She had greatly improved in appearance, and stated that she had been quite well, and had attended to her household duties since she left the hospital after the operation. The opening in the sac remained for four months after she went home, but finally closed altogether, and gave no trouble afterward. She had a ventral hernia, which appeared at the point of the wound two years after the operation.

I am satisfied that in certain cases in which the adhesions are extensive and very vascular that it is safer to leave the operation uncompleted, and employ drainage.

I have had five successful cases treated in this way, and one very bad case that proved fatal, but probably would have recovered had the patient not had organic disease of the kidneys, of which she died. Mature judgment, based upon experience alone, can enable one to determine when to employ drainage in place of removal of the tumor. The only way to determine this is to examine the extent of the adhesions, and whether or not they can be separated without injury to the abdominal viscera. Should the cyst prove unmanageable by the operator, the part of it which can not be removed should be left and treated by drainage, and washed out with antiseptics. I am well aware that an expert and experienced operator can manage very formidable adhesions, but, when an operator of limited ability encounters adhesions that he can not handle safely, he will be more sure of success if he relies upon draining the cyst or that part of it which can not easily be removed. Recovery is sometimes tedious, but generally sure, according to my observations.

The following cases of suppurating ovarian cysts, reported by Dr. Keith, together with his comments on them, are of such great value that I quote them in full:

SUPPURATING OVARIAN CYSTS.

The following narratives help to show that operation ought to be the rule of practice in cases of acute suppurating cysts, or when typhoid symptoms come on after tapping:

Ten years ago, when cases of ovariotomy were few, and there was little to guide one in unusual circumstances, a young woman in the last stage of ovarian disease came to me a long journey from the north. The fatigue of traveling was too much for the strength that was left, and she arrived completely worn out. It did not seem possible that, in such a condition, life could be prolonged many days, for the pulse was almost imperceptible, there was vomiting and diarrhœa, œdematous limbs, and albuminous urine, while a profuse fetid discharge was going on from an opening near the umbilicus. The intensity of this putridity was such that one became aware of it before entering the house, and the antiseptics of those days were powerless to arrest it. Day after day I went expecting and hoping to find her dead, yet, though shriveled up like a mummy, with an aspect scarcely human, respiration went on for nearly a month, the brain retaining its clearness, acutely alive to what was going on around. To remove a putrid cyst in such a condition of feebleness did not at that time even occur to me; yet, since then, I have operated more than once under circumstances not less unfavorable, and, looking back upon this case now, I think that operation might have turned out well; certainly death after it would have been the more merciful way.

Soon again (December, 1864) there came another case of very large tumor. The patient had been jolted for some hours in a coach, and, in the hope of relieving the pain thus set up, tapping was performed after her arrival. The pain was not relieved, abdominal distention from flatus became excessive, and typhoid symptoms rapidly set it. Fearing a repetition of the slow-death process—which those who saw will not easily forget—ovariotomy was this time performed during the semi-delirium of septic fever. This was probably the first time that surgery broke in upon an acutely inflamed peritonæum. The intense lividity, amounting almost to blackness, of the abdominal contents, and the spongy tenderness of inflamed intestine, were then strange to me, though thought little of now. Recent lymph was present everywhere, adherent bowel and mesentery hedged in a thick-walled cyst, the base of which was in a complete state of slough. Inflammation had gone on to gangrene, and there was intense putridity, just as in the previous case. After an operation which went on for two hours, the patient was placed in bed, cold, vomiting, and nearly pulseless. It seemed as if we had simply killed her, yet she got rapidly into heat, the restless delirium at once disappeared, there were warm perspirations, much sleep, and a recovery without a drawback.

This case, which was at the time fully reported in the "Lancet," 1865, page 480, has been to me as a landmark. Since then I have ten times met with cases of acute suppurating cyst, besides two chronic cases. In all of these, save one, the chance of ovariotomy was given, however hopeless looking the case might be. In the exceptional case ovariotomy would also have been performed had it been possible to remove the patient from her poor home and unfavorable surroundings. She was seen with Dr. Menzies on the third day after her fourth confinement. He had been called to her for the first time only the day before. A large ovarian cyst had existed with at least two of her pregnancies. The distention was so enormous that urgent dyspnœa had to be relieved at once by tapping. Upward of six gallons of fluid, containing much blood and pus, were got away, and ovariotomy was agreed on as soon as she could bear removal. This could not be accomplished, and, after three weeks, tapping was again had recourse to. This time the pus was intensely putrid, and, as the cannula got choked with pieces of fetid lymph, an incision, sufficient to admit two fingers, was made into the cyst, and its putrid contents thoroughly cleared out. Fortunately, the cyst was single; a perfect recovery took place, and this patient has had two children since. None but the strongest of women could have borne the exhausting suppuration that went on for nearly four months. Pulse and temperature remained high, and of at least six weeks of her illness she has now almost no remembrance. Recovery in such circumstances must be rare; yet it may be well to note that during the whole time she was supported entirely on milk and buttermilk, and had no stimulants whatever; neither was there any washing out of the cyst.

Of the ten more or less acute cases operated on, eight recovered, while the two chronic cases got well easily. During 1872–'73 several came about the same time, and the following series of seven occurred in the course of my second hundred operations for ovarian tumor, none of which have yet been published. To an onlooker, few operations look so hopeless as those for the removal of acute suppurating cysts. The general condition is always unfavorable, and, as a rule, ovariotomy is in these circumstances tedious and severe. To be believed in, such cases need almost to be seen.

Suppurating Ovarian Cyst; Ovariotomy; Recovery.—Mrs. M., aged thirty-five, was sent to me in the end of June, 1871, by Dr. Soutar, of Golspie. An ovarian tumor was detected toward the end of 1869. In January, 1870, she had severe abdominal pain. After a fortnight's rest, this passed off, but only to return with increased severity. Loss of flesh and rapid growth of the tumor followed, and it was nearly a whole year ere she was again able to be out of bed. During this time her sufferings, as told by a friend, must have been great. Often for weeks together she could not be moved from one position, while the changing of her dress, or the arranging even of the bedclothes, brought on such pain that her cries were heard in the street. It was eighteen months after her first illness that she was able to make the journey to town. I saw her after she had rested two days. The pulse was then 156; the temperature 103°.

She was a tall, fair-complexioned, blanched-looking woman, extremely emaciated; the lips and fauces were very anæmic; the girth at the umbilicus was forty-six inches; the lower part of the tumor felt solid, but fluctuation was distinct above the umbilicus; the abdominal wall was hard, thickened, and œdematous; the skin even in some places feeling as if adherent. It was evident that there were adhesions of a very unusual nature.

Two days after this examination, with the assistance of Dr. Drummond, of Nice, I removed three gallons of thick pus by tapping some inches above the umbilicus. A large, prominent, hard tumor remained below this. Much relief followed, and for a few days the pulse and temperature somewhat fell. In three weeks the cyst had refilled; the pulse was again rapid and feeble, varying from 120 to

160; the morning temperature was 101° to 102°; that of the evening, 103° to 104°, sometimes higher. The skin was dry and shriveled, and she was, if possible, thinner than before.

Ovariotomy was performed on the 13th of July, 1871. Sulphuric ether was given. The incision extended from the umbilicus downward eight inches. The wall was much thickened, the peritonæum of almost cartilaginous hardness, and the whole parts so unusually vascular, that no time had to be lost in completing the operation. The upper cyst was emptied of its purulent contents, the lower semi-solid portion thoroughly broken down, and the cyst-walls, weighing eighteen pounds, dragged out. There was not any part of the tumor non-adherent. The connections were of the utmost firmness, especially those in the pelvis. Posteriorly, there was more adherent intestine and mesentery than I have met with except twice. The peritonæum was thickened by old lymph. Large flakes, like pieces of cartilage, were peeled off the wall after removal of the tumor. Some of these were as large as the hand, and it was difficult to tell what really was the peritonæum. All bleeding points were tied with Lister's ligatures, a broad, thick pedicle secured by a clamp, and the wound closed with silk sutures.

The operation lasted upward of an hour; much blood had been lost, and she was placed in bed with great fears for her immediate safety. She lay for some hours with an almost imperceptible pulse. She was restless, and great bursts of clammy perspiration broke out every now and then, such as one sees in those suffering from the shock of injury. Fortunately, there was no vomiting. By evening she was comfortably warm; flatulence was troublesome; there was much thirst. Pulse, 125; respirations, 32; temperature, 102.°

She slept during the night, but got low and faint toward morning, and there was some vomiting. Brandy and soup enemata were given every two or three hours. She improved toward evening. Flatus first passed forty-four hours after operation. The pulse was rapid and feeble, and she scarcely opened her lips for many days. In the third week there was pain and swelling in the right iliac fossa, and fluid formed. Four weeks after operation this swelling was punctured, and about a teacupful of yellow serum was removed by a syringe; the rest was absorbed. She was able to return home in five weeks, and is now a strong, healthy woman.

CHAPTER XXXI.

DISEASES OF THE FALLOPIAN TUBES.

Before considering the various morbid conditions of the Fallopian tubes, I shall briefly review their anatomy.

The tubes—one on either side—are contained in a fold of the peritonæum attached to the broad ligaments, and run transversely from each lateral corner of the uterus out to the ovaries, to which they are joined by a short, ligamentous cord. Each tube, or salpinx, is four to five inches long; the right tube is usually slightly longer than the left. The diameter increases from the uterus toward the ovary; and the canal similarly increases. They are formed of an external peritoneal covering, of an internal mucous surface, and of an intermediate proper muscular tissue, arranged in two layers, of which (1) the longitudinal seems to be a prolongation from the uterus; while (2) the circular, peculiar to the tubes alone, ends as a kind of sphincter upon the abdominal orifice.

The mucous membrane is lined with cylindrical epithelium, the motion of whose cilia is toward the uterus. Numerous fusiform cells are found in an incompletely developed connective tissue. The arteries arise from the utero-ovarian trunk, entering the substance of the tube at its lower border. The veins empty into corresponding vessels. The nerves come from the hypogastric and ovarian plexuses.

A study of the development, in the embryo, of the female organs of generation, shows the closest structural relationships existing between the tubes and uterus. Some observers claim that part of the menstrual blood comes from the tubes.

Anomalies of form and situation are frequent; the tubes may be absent; there may be only one tube; alternate stenosis and dilatation may exist; and there may be marked difference in length between the two tubes.

Two abdominal orifices for a tube may exist, and fimbriæ from each may project into the peritoneal cavity.

Again, the tube may be dislocated, twisted, bent into knuckles, or may have suffered hernia along with portions of the intestine.

The tubes may open into the womb abnormally low down, which may possibly account for placenta prævia in some cases.

J. Whitridge Williams has called attention to a diverticulum extending from the lumen of the tube into its wall, and reaching almost to the peritoneal covering. Such diverticula he has found to be lined with the typical single layer of ciliated epithelium, and to be in all respects like the tube itself. In speaking of this malformation, Williams says that these diverticula may hold a causal relation to tubal pregnancy. A fertilized ovum might readily be driven by the action of the cilia into such a *cul-de-sac*, and there develop.

The tube may be completely separated from the ovary. A rare condition is hernia of the mucosa, where the muscular tissue is absent, or so weak that it allows the mucous membrane to protrude, forming a pocket into which the fecundated ovum may drop.

Neoplasms may be found in the tubes; among them tubercle, carcinomata, sarcomata, cysts, fibromata, myomata, lipomata, and papillomata. Morgagni's hydatid is a vesicle often hanging to a fimbria. Cysts, tubercles, and fibromata are the most frequent of these neoplasms, but even these are so rare that they need only to be mentioned here.

So many morbid tubal conditions are either direct or indirect sequelæ of salpingitis, or "catarrh of the tubes," that this condition first demands attention.

Salpingitis.—Inflammation of the tubes may be acute or chronic.

Pathology.—In acute catarrh the mucous membrane of the tube s thickened, congested, and covered with neutral or acid mucus, muco-pus, or an opaque fluid which contains lymph-corpuscles and epithelial cells which are changed in form or which have undergone granular degeneration.

The longitudinal folds of the mucosa are effaced; the fimbriæ are obliterated or obscured by inflammatory products, and the ends of the tubes are usually closed. If not, the contents of the tube enter either the uterus or the abdominal cavity, in which latter case pelvic peritonitis results. In very severe cases (and sometimes in diphtheria) false membranes may be formed in the mucosa.

Peri-salpingitis usually occurs in severe cases. The tube is inreased in size, tortuous, and dilated irregularly, and when the puruent secretion accumulates, the tube, which is closed at each end, beomes greatly distended. This is known as pyosalpinx. In this ondition the epithelia are flattened and the mucous and muscular oats are gradually thinned, so that rupture into the peritoneal cavy is not infrequent, in which case general peritonitis or pelvic peritonitis results. In rare cases the rectum has been perforated and the contents of the tube discharged through that viscus.

Chronic catarrh is accompanied by the adhesions of the tube to the neighboring organs in some cases, the result of localized peritonitis. The lower part of the tube is adherent oftener than other adjacent parts. The ovary is also congested or inflamed in the majority of cases. The mucosa is much thickened, and secretes a fluid which is either thin and watery or thick and cheesy, not purulent as in acute salpingitis.

Occasionally, chronic dropsy of the tube is the result of the secretion of serous fluid, and the tube may become distended and form a small cystic tumor; or it may be converted into several distinct cysts without any intercommunication, since the tube between them has been totally obliterated by the inflammatory process.

This is known as hydrosalpinx. In this condition all the coats of the tube sometimes become extremely thin. Dropsy of the tube may suddenly terminate when an opening of the duct into the uterus occurs; this, however, is very rare.

Cases are recorded where a hydrosalpinx has communicated with an enlarged and diseased ovary.

Symptoms.—This affection so often follows gonorrhœa or endometritis that the symptoms of salpingitis are merged with those of the primary disease or are completely masked by them, until pelvic peritonitis occurs. This is the most dreaded outcome of salpingitis, and too frequently the first symptom which leads one to suspect its occurrence. Usually, however, when salpingitis occurs there is an increase in the symptoms so marked as to attract attention. The pain, though less pronounced than that of peritonitis, is sufficient to compel the patient to rest in the recumbent position. There is usually some constitutional disturbance or slight symptomatic fever. In acute cases this fever is well defined, and attended with deranged digestion and nutrition. In short, it may be stated that the local and constitutional symptoms are the same as in other pelvic inflammations, less acute than in pelvic peritonitis or pelvic hæmatocele, but as well marked as in pelvic cellulitis of a mild type. When pyosalpinx occurs there are symptoms of mild blood-poisoning.

Menstrual disturbances usually occur in salpingitis, but not always. It frequently happens that the severity of the symptoms is lessened, indicating that the inflammation has subsided, but it again lights up, and becomes for a time as marked as at first.

Periodical watery fluxes with diminution in the size of a swelling in the region of the tubes, and accompanied by colicky pains, are indicative of tubal dropsy where the tube is incompletely closed near the uterine end.

Physical Signs.—In the first days of the inflammation, before the tubes are distended, the chief sign is tenderness in the region of the tubes. When a tumor can be made out it is felt to be elongated, fluctuating, movable, not separable from the uterus, and lying on one side in the retro-uterine space.

By aspirating, a fluid which contains columnar ciliated epithelium is found. Of twenty-one cases in which the fluid was examined by my colleague, Dr. F. Ferguson, this epithelium was found in nineteen. This is a most valuable diagnostic sign, but as aspirating is not without danger it should not as a rule be resorted to.

Except when the tube is enlarged a positive diagnosis of salpingitis can not be made.

The condition with which salpingitis is apt to be confounded is a small ovarian cyst. It is impossible, often, to positively decide this question immediately. By waiting and watching the case the ovarian cyst will be found to gradually become larger without any increase in the constitutional symptoms; while in tubal disease the increase in size is limited.

Prognosis.—I believe that salpingitis may subside, but as a rule the tube is obliterated entirely or in part. When hydrosalpinx occurs there is not much chance of recovery. In pyosalpinx recovery can only be insured by removal of the tube.

Causation.—Gonorrhœa of the uterine mucosa and simple and puerperal acute endometritis are its chief causes; but it may occur during the course of any acute infectious disease, from the presence of neoplasms or from intense hyperæmia of the generative tract, as in prostitutes.

It is possible that syphilis may cause it, just as it causes otitis or ozena. Sometimes it is secondary to diseases of the ovaries.

Microbes may find entrance into the tubes, and on this (not yet proved) statement, Sänger, of Leipsic, classifies salpingitis as S. gonorrhoica, S. tuberculosa, and S. actinomycotica. He also has a salpingitis septica including S. pyæmica, ichorosa, purulenta, and diphtheritica, which are due to specific microbes identical with those producing traumatic infection.

Treatment.—Acute and subacute salpingitis, in the early stages, should be managed in the same way as other inflammations of the pelvic organs and tissues. Rest and anodynes for the relief of pain, counter-irritation, and attention to the bowels are the chief indications. When the acute symptoms subside, iodine, ichthyol, and mercury have been used locally, and massage and electricity also, with some possible good results.

When once hydrosalpinx or pyosalpinx is developed it is doubtful if any treatment except laparo-salpingotomy is effective. Certainly this is the case in pyosalpinx.

Laparo-salpingotomy as first practiced by Tait and Hegar is the recognized treatment in these otherwise incurable diseases of the tubes, and the results are very satisfactory. It is not always possible to ascertain whether hydrosalpinx or pyosalpinx exists; hence it is wise to perform laparotomy and remove the diseased tube if it is the seat of pyosalpinx; should a hydrosalpinx be found, it may be deemed best to try stripping the tubes or catheterizing and cleaning them out and restoring them to their normal situation, and trust to curing the trouble thereby. This has been tried by Polk, but the results are not sufficiently well known to determine the merits of this procedure. In the former case the woman is sterile, in the latter not necessarily so.

TUBERCULOSIS OF THE TUBES.

Pathology.—In this condition the tubes are rigid, thick, and bound down by pseudo-membranes. The thickening results from infiltration.

Acute catarrhal salpingitis ordinarily co-exists. Both ends of the tube are usually closed, but between them the cavity is much dilated, containing mucus, muco-pus, pus, or cheesy *débris*. The vessels of the tubes are enlarged and thickened and the nodules, upon them, as well as the nodules on the mucosa and in the muscularis, contain the tubercle bacillus.

Symptomatology.—The tubercular diathesis which is usually present is the only indication of the nature of this affection. It may be possible to recognize the dilated tube by palpating the abdomen, and by manual examinations when its immobility, size, tortuosity, and nodular feel, taken in connection with the constitutional conditions, causes us to suspect tuberculosis of the tube.

Possibly the dilated tube may be felt by a vaginal examination. German gynecologists advise that the secretions from the uterus should be examined for the bacilli, which if found are evidence of tuberculosis.

Treatment.—Were it possible to diagnosticate isolated tuberculosis of the tubes, extirpation would afford a means of (possible) radical cure.

HÆMATOSALPINX.

Blood in the tubes induces hypertrophy of the walls except at one point, which, growing thinner and thinner, forms a sac varying in size from a pin's head to an orange. Any portion of the tube may be the seat of such a tumor. Fatty degeneration or ulceration of the walls of the tube may induce rupture and peritonitis. At times the uterine end of the tubes permits of partial or complete evacuation of the tumor.

Symptomatology.—The symptoms are the same as those of hydrosalpinx except that they are more acute at first, and at the time of the menses are all markedly increased in intensity.

Etiology.—Intense hyperæmia of the genitals, retroversion, typhoid fever, measles, and purpura hæmorrhagica have been known to cause hæmatosalpinx. When blood can not make its way out of the uterus it may flow back into the tubes. There is no doubt, however, that the mucous membrane of the tubes alone is capable of being the source of the hæmorrhage.

Treatment.—Laparo-salpingotomy is the proper treatment, and if the diagnosis is made the tube should be removed before peritonitis occurs. The prospects of a favorable result are then very good.

LAPARO-SALPINGOTOMY AND OVARIOTOMY.

The operation for the removal of the tubes and ovaries differs in many respects from that of ovariotomy for cystomata, and requires a word of description.

The incision in the abdominal wall should be short, just sufficient to admit two fingers. Extra care is necessary to avoid wounding the omentum or bowels. If the intestines are adherent to the abdominal wall, the incision should be enlarged in order to find a part where there are no adhesions, before opening the peritonæum. This is easier than to separate the intestines. This complication is, fortunately, seldom met. I have often found the omentum adherent to the intestines, and occasionally to the abdominal wall near the median line, but it is generally free on one or both sides, so that the tubes and ovaries can be reached by passing the fingers beyond the adhesions and pushing the omentum to one side. When no free part can be found, the omentum should be picked up and divided in the incision, and the bleeding vessels tied. Two fingers should be passed into the wound and the fundus uteri found. This is a guide to the tubes. Adhesions, which are usually present, should be separated gently; and when both tube and ovary can be found, they should be hooked up with the fingers and brought out through the wound, or into it. By traction in this way a pedicle is found and included between the fingers, when it can be transfixed and tied. The Staffordshire knot is the best to use.

Much skill, which can only be obtained by practice, is required to separate the adhesions and bring out the tubes and ovaries. If the adhesions are old and can not be broken up easily, it is safer to enlarge the wound and tie and divide them.

If the tubes are largely distended and their walls thin, the adhesions should be separated only where that can be easily done, and the tubes emptied, or partially so, with the aspirator, and then seized with the forceps and brought out and the adhesions separated. The pedicle is then ligated, and tube and ovary removed. Where there are many adhesions there will be some bleeding, which usually can be stopped by pressure, but it is safe to drain for a day or so.

The after-treatment is the same as after ovariotomy in general.

The highest authorities agree, at the present time, that when both ovaries and tubes are diseased and require to be removed, the uterus should be removed also. Various reasons are given for this. Some surgeons contend that the operation is more easily performed than when the uterus is left. This is my own opinion, and I practice accordingly in suitable cases. When the adhesions are not very extensive and the disease of the tubes does not extend close to the uterus, a pedicle can be formed and controlled by one ligature, or, better still, the electric hæmostatic forceps. I prefer to operate in the old way described above. On the other hand, when the distention of the tubes extends close to the uterus and the adhesions are firm, I remove the uterus also. Kelly's method is the one for which I have preference. The operation is exactly the same as abdominal hysterectomy, already described in treating of uterine fibromata. At the present time I use the hæmostatic forceps instead of the ligature to control the vessels. In this method of operating the cervix uteri is not removed.

Those who believe that the uterus is not only a useless but a dangerous organ after the ovaries have been removed, insist upon complete extirpation of the uterus in all cases requiring double ovariotomy. Very much has been said and written on this subject within the past few years, and although many positive opinions have been expressed, I fail to see that they are based upon sufficient clinical observation.

For the present I have adopted the following rules of practice: I completely extirpate the uterus in connection with laparo-salpingo ovariotomy when there is septic endometritis present, or any other disease of the uterus that does not promise to disappear when the ovaries are removed, and when there are extensive adhesions and secondary cellulitis of the broad ligaments—conditions that require after-drainage. When it is possible to determine beforehand that complete extirpation of the uterus is indicated, I circumcise the vagina with the galvano-cautery, and separate the uterus from the bladder up to the peritonæum before opening the abdomen.

ILLUSTRATIVE CASES.

Hydrosalpinx; Repeated Discharge of the Contents of the Tube through the Uterus; Recovery.—My friend Dr. William H. B. Pratt called me to see a rather delicate and very refined lady, who gave a history of some rather obscure pelvic affection which had existed for more than a year. The doctor found, when he was first called to see her, that she had a retroversion of the uterus, and presumed that this was the whole cause of her suffering. He was able to restore the uterus to its place, but could not keep it there, because a pessary or cotton tampon caused great suffering. This was the history at the time that I saw her. I also learned that she was unable to ride or walk for any length of time, owing to the severe pelvic and rectal tenesmus which the erect position brought on. By a digital examination I found the retroversion of the uterus, and also a cystic tumor, low down on one side of the sac of Douglas. The tumor was oblong and elastic, and there was distinct fluctuation. I suspected that it was an ovarian cyst.

Treatment gave her some relief, but she did not recover. She had repeated attacks of pain in the pelvis, and suffered so much on taking exercise that she was obliged to live an invalid life.

Some time after seeing her the first time she menstruated more freely than normal; had more pain and discomfort than usual. Soon after the menses she had a sudden and free discharge of fluid of a whitish, turbid character, and was much relieved after it. I examined her soon thereafter, and found that the cystic tumor had entirely disappeared. Her symptoms, though modified for a time, returned again, and again the tumor was found in the same place. Another discharge of fluid occurred, followed by relief and the disappearance of the tissues.

This much of the history, in the way of filling and emptying of the tube, was repeated a number of times, with this difference, that the accumulation of fluid was less.

I regret that I do not have notes of the length of time that the trouble lasted, but it will suffice to say that the patient recovered completely, and has had no return of her hydrosalpinx of seven years ago.

Double Pyosalpinx; Recovery without Operative Interference.—The notes of this case were given to me by Dr. Buckmaster. The history is a rare one, and is of special interest. I have in the past doubted if ever pyosalpinx ended in recovery without removal of the tubes, but this case shows that such may occur. The patient was twenty-five years old, and married. She had an abortion produced, and peritonitis and salpingitis followed this maltreatment. Dr. Buckmaster saw her two weeks after the time of the abortion. She was then suffering from severe pelvic inflammation. The temperature was at that time 104° F. There was marked pain, tenderness, and abdominal distention. The products of the inflammation quite filled the pelvis, and there was fixation of the uterus. She was treated in the usual way by the doctor, and at the end of two months from the time that she first came under his care the inflammatory products had largely disappeared, and the uterus was slightly movable, but on each side there were two masses about the size of small lemons. Several days afterward there was a sudden discharge of ill-smelling pus. On examination at this time it was found that the mass on the left side had disappeared. Soon after this there was another free discharge of pus, and the mass on the right also disappeared. For three months subsequently there was a slight but constant discharge of pus from the cervix uteri, but finally it ceased. One year from the attack the patient was in fair health, but suffered from pelvic pain at times, which appeared to be due to adhesions of the peritonitis.

The histories of many cases of pyosalpinx might be given in which no benefit could be obtained by general treatment, but were promptly relieved by salpingotomy. In fact, the only reliable treatment for the relief of this affection of the tubes is to remove them. The operation is the same as for the removal of the ovaries, and need not be described here. Those who desire full details of this subject are referred to the works of Lawson Tait, whose brilliant achievements in this department of surgery were the first and greatest.

No case of hæmatosalpinx has come under my observation, hence the reader is again referred to Lawson Tait for cases illustrating this subject.

Double Pyosalpinx; Amputation with Hæmostatic Forceps; Recovery.—Entered Long Island College Hospital, September 21, 1896.

D. G., native of Norway, and single, began to menstruate at thirteen years, and regular. Ten months ago came to this country; had amenorrhœa for three months, then menstruated with severe pain for one day; since then menses have been normal.

One month prior to admission was seized with severe pain in the left ovarian region, which gradually extended to the right and across the back. At this time there was a profuse yellowish discharge from the vagina, together with painful and frequent micturition.

Diagnosis.—Pyosalpinx (double).

Treatment.—September 27, 1896, abdomen was opened, the ovaries and tubes were freed from adhesions, and the broad-ligament pedicle on either side seized with the long compression forceps, current turned on and continued for two and a half minutes. The tube and ovary were amputated, when hæmostatic forceps were removed and there was no hæmorrhage. A number of bleeding points deep down in the pelvis were treated by the method in question. Abdomen was closed with silk. Time consumed in operation, twenty-five minutes.

Convalescence progressive and uneventful. Temperature on third day, 100·5° F.; pulse, 102. This was the highest temperature until the sixteenth day, when it was 102° F.; the next morning it was down to normal. Cause of rise unknown. Sutures removed on the eighth day; primary union.

Left hospital three weeks after operation.

CHAPTER XXXII.

PELVIC CELLULITIS.

The anatomical distribution of the pelvic cellular tissue is the same as that in all other parts of the body, and its function in this region is also the same as elsewhere. It fills in all the interspaces between organs and tissues, being most abundant where there is the greatest mobility, and it is the principal accommodating and protecting medium through which the blood-vessels and nerves are conveyed to all parts of the body. In the pelvis it fills all the unoccupied spaces lying between the pelvic organs, except between the peritonæum and the middle portion of the fundus uteri. At that point it exists (if at all) in so small a quantity that it can not be demonstrated. Inflammation of the cellular tissue here located has received many names—pelvic cellulitis, peri-uterine cellulitis, parametritis, peri-uterine phlegmon, pelvic abscess, and inflammation of the broad ligaments.

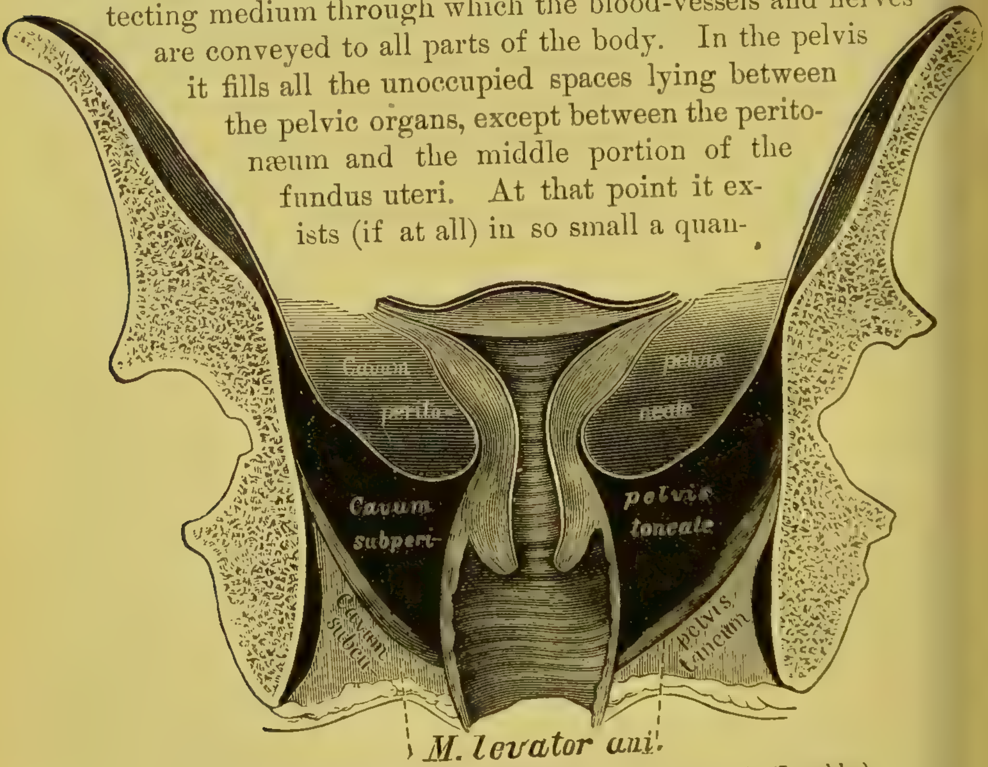

Fig. 229.—Diagrammatic transverse section of the pelvis (Luschka).

I prefer the term pelvic cellulitis, which was given to it by Sir James Y. Simpson because it indicates the nature and location of the disease. Inflammation of the cellular tissue may occur wherever that form of tissue is found, hence the term pelvic cellulitis does not definitely locate the site of the disease, and yet the name is as specifically descriptive as any of the other terms used. Moreover, pelvic cellulitis, limited to the areolar tissue around the cervix uteri and between the folds of the broad ligaments, comes under the observation of the gynecologist more frequently than in any other location in the pelvis; hence it should be understood that the term pelvic cellulitis is here applied to inflammation of the cellular tissue, located in the broad ligaments and about the supravaginal portion of the cervix uteri.

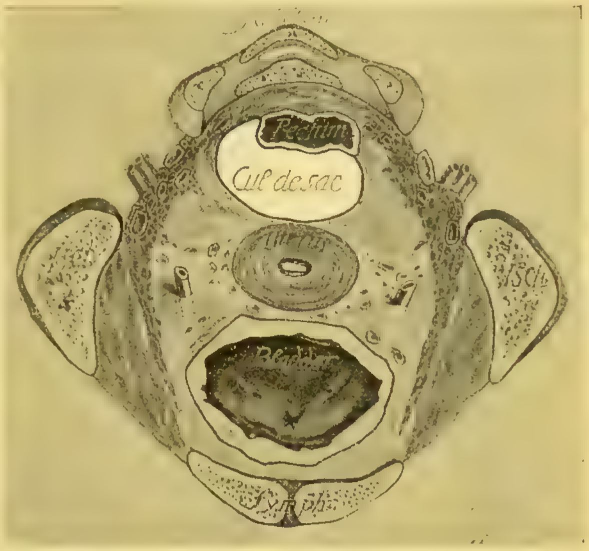

Fig. 230.—A section through the sacrum, the symphysis pubis, and the ischia, to show the cellular tissue on each side of the uterus. The vessels are seen here in the bases of the broad ligaments and the ureters are shown projecting. The lateral muscular tissues are the levatores ani and the obturators. (Modified from Freund.)

Pathology.—This differs in no respect from inflammation of cellular tissue elsewhere, except so far as it may be modified by the peculiarities of the location. There is first a stage of active congestion, followed by an effusion of blood serum, and later an exudation of the higher organized constituents of the blood, and finally suppuration.

In some cases the inflammatory process stops short of suppuration, and the products of the inflammation are removed by absorption, and the recovery is soon completed. This is called ending in resolution. There are a few cases in which the products of the morbid process are packed so densely into the tissues that the circulation is arrested and the cellular tissue destroyed, and a dead mass or slough is formed. These cases, fortunately rare, are very severe, and sometimes fatal. They are also complicated with inflammation of other organs in the pelvis, as a rule. In fact, fatal cases are generally complicated, the uncomplicated cases rarely proving fatal. When suppuration takes place the pus usually makes its escape by some one of the following avenues, mentioned in the order of frequency as nearly as can be: Vagina, rectum, bladder, abdominal walls, saphenous opening, pelvic floor near the anus, pelvic foramina, obturator or sacro-ischiatic foramen, and through the pelvic roof into the peritoneal cavity. I have seen three cases in which the pus from an abscess in the broad ligament burrowed outward to the iliac fossa, and then extended upward to the diaphragm, and in one it opened through the lung into the large bronchial tube. Brief histories of these cases will be given at the end of this chapter. When the pus escapes into the vagina or rectum at the most dependent part of the abscess sac, the evacuation is usually complete and the after-drainage favorable; the walls of the abscess come together, and the cavity is soon closed. The walls of the sac become thin by absorption, the fixation and swelling of the parts subside, and the recovery is complete.

In examining a case in after years that I had treated for cellulitis I found that all traces of the disease had disappeared, so far as could be ascertained by physical exploration, and the functions of the pelvic organs were all performed normally, thus showing that the recovery was complete. This is the history of the pathology of the simplest cases of pelvic cellulitis.

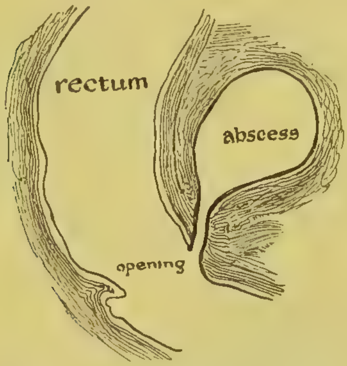

FIG. 231.—Pelvic abscess opening obliquely downward.

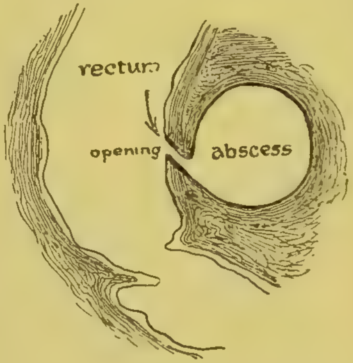

FIG. 232.—Pelvic abscess opening obliquely upward.

When the pus escapes into any other pelvic viscera at a point above the most dependent part of the abscess sac the evacuation is necessarily incomplete and the drainage imperfect. Chronic suppuration and discharge will occur under such circumstances, and the duration of the case is very indefinite. This is often the result when the point of escape is through the abdominal walls or the pelvic foramina; but the same thing occurs sometimes when the opening is into the vagina or rectum or bladder, especially the rectum.

Judging from several cases that I have seen in which the opening was into the rectum, I am inclined to believe that the direction of the opening has something to do with keeping up the suppuration. When the opening is low down, and enters the rectum obliquely downward, and the drainage is complete, the opening will close promptly (Fig. 231); but if the opening into the rectum is direct or obliquely upward, the contents of the bowels will escape into the abscess sac, and keep up suppuration for an indefinite length of time (Fig. 232).

These conditions in the pathology of cellulitis afford a reasonable explanation, perhaps the true one, of the difference in progress between cases that, up to the time of evacuation of pus, appeared to be alike. There is yet another condition in the morbid products of the disease which retards recovery. In place of the suppurative process, involving the whole mass of inflammatory products, a number of small abscesses are found producing a honey-comb state of the parts, a number of small abscesses opening into each other by small sinuses, and all opening into some of the pelvic viscera, by one or more openings. This pathological condition delays the progress of the case greatly. All these exceptional peculiarities in the pathology which complicate the progress of the disease also tend to make the after-effects—i. e., the damage to the pelvic organs—greater. The walls of the abscess are thicker, and the scar left in the tissue contracts more, and hence displacements are often found. Pelvic pains of a neuralgic character often follow, and the functions of the pelvic organs, uterus, rectum, and bladder are to some extent occasionally deranged.

There is still another form of behavior noticed in some cases. Suppuration takes place at one point, usually a small one, and instead of the pus escaping in the usual manner, it finds its way into the circulation, causing septicæmia, which is intermittent in character. The temperature and pulse run up high for a time and then subside, the fever being sometimes preceded by a chill or rigor. These paroxysms are repeated over and over again, the general nutrition of the patient being greatly impaired.

Causation.—The chief cause of pelvic cellulitis is septicæmia, and is usually traumatic in its origin. Injuries to the uterus and vagina during parturition or abortion develop septic material which is conveyed to the cellular tissue by absorption through the lymphatics principally. It is possible that lymphangitis is primarily developed, and subsequently cellulitis. Be this as it may, the fact is that two thirds of all the cases occur after abortion or parturition. Whenever cellulitis follows parturition, it may be presumed that it is caused by the absorption of septic material from the parturient canal. It is possible, however, that contusions of the cellular tissue occurring during parturition may give rise to decomposition of the injured tissue and septic cellulitis, which in that case is autogenetic, and not due to absorption.

The other and far less common causes of cellulitis are surgical operations, the use of caustics, ill-fitting pessaries, dilatation of cervix uteri with sponge tents and direct blows, but with all of these the cause is septic, the morbid material being developed by the injury.

Cellulitis occasionally occurs secondarily to some pre-existing inflammation, such as endometritis, pelvic peritonitis, salpingitis, and ovaritis. These last-named affections, when they precede the cellulitis, stand in a causative relation to it. It quite frequently happens, however, that the above-named diseases are developed in the course of a cellulitis, and are caused by it, and hence become complications of the cellulitis.

The duration of cellulitis varies very much according to the extent of the inflammation, but more especially is the progress modified by the termination of the inflammatory process. In case that resolution takes place, recovery may occur in a few weeks, but on the other hand, if suppuration occurs and the discharge of pus is incomplete, owing to the unfavorable point of escape, then chronic suppuration may go on for months or years.

When suppuration takes place and the discharge of pus is at the dependent part of the abscess, the average duration of the disease is about six weeks. Much has been said about chronic cellulitis, but I have never been able to recognize any such condition. Chronic suppuration in a badly-drained abscess may go on for any length of time—this we often see; also, frequent or repeated attacks of cellulitis may occur, but a chronic or continuous inflammation such as we see in inflammation of mucous membranes, is something which I have never met with in practice. This is quite in accord with what we know of cellulitis elsewhere, where the process begins, progresses, and ends and recovery follows, or, it may be, that the inflammation progresses to the stage of suppuration, and for some reason suppuration is kept up, but this is simply a chronic condition of one stage of the process.

I think that the so-called chronic cellulitis, recognized and treated as such by some authorities, is nothing more than the products of the inflammation which remain after the inflammation itself has subsided.

The consequences of pelvic cellulitis depend largely upon the extent of the tissue involved and the quantity of inflammatory exudate. Sometimes, the tissues become infiltrated with the products of the inflammation which do not all break down in the suppurative process; when this occurs, it requires a long time to effect the absorption of these products, and during that time the patient is likely to suffer from derangement of the functions of the pelvic organs and also from pelvic pain. So, also, when the products of the inflammation have all been disposed of, if much damage has been done to the tissues, which is usually the case, contractions follow which are apt to displace the pelvic organs to some extent, and to give rise to trouble; and yet, in the majority of uncomplicated cases of cellulitis, complete and perfect recovery generally takes place. This, I have frequently been able to verify by subsequent examination of cases that I have formerly treated. More than that, it not infrequently happens that patients, after a well-defined cellulitis, recover and bear children, showing conclusively that the recovery was complete and perfect.

In the clinical history of pelvic cellulitis, as manifested by the symptoms and physical signs presented, there is a great variation in different cases; just as the extent of the local lesions differ in degree and extent, so the symptoms vary in their severity. There is usually a decided symptomatic fever as indicated by the frequency of pulse and elevation of temperature. This may, or may not be preceded by a chill or rigor which is promptly followed by fever.

The temperature as a rule is not high, from 101½° F. to 103° F. being about the range. There is also marked derangement of the digestive organs; sometimes, there is some nausea and vomiting, lmost always tympanitic distention of the bowels, and usually contipation. It is rare that there is any delirium or very marked depression of the nervous system. The patient usually complains of pain, the intensity of which varies considerably; it is usually most marked in the rare cases which arise from causes other than parturition at the full term.

When the cellulitis follows delivery, there is abundant room for he products of the inflammation in the cellular tissues of the largely eveloped broad ligaments, and so the pain which is usually caused y pressure of these products, is not so great. In other cases due to njuries, intercellular hæmorrhages, and the like, the tissues resist he distention and the exudation, and hence the pain is much greater, nd there is usually decided disturbance of the function of the pelic organs.

If the attack comes on when the menstrual period is near there ay be a menorrhagia. There is also quite often vesical and rectal nesmus. There is tenderness on deep pressure in the iliac regions, and the pain is usually aggravated by any movement on the part of the patient. This usually compels the sufferer to rest quietly on the back. Occasionally some relief is obtained by drawing up the limbs while resting on the back, but this position is not by any means as frequently assumed and persistently maintained as in peritonitis. These symptoms, both general and local, usually continue without much modification, except that relief which may be obtained through the influence of medication, until the exudation is completed; then there is usually a lowering of the temperature and pulse, and relief from pain. The temperature, however, usually remains above 100° F.

When suppuration begins, there is a renewal of the symptomatic fever; sometimes a chill precedes this recurrence of fever. On the other hand, if resolution takes place, the fever does not return to any very great extent. During the suppurative process until the time when the pus is discharged, the temperature remains usually above 100° F., sometimes, suddenly running up to 103° F., indicating that there may be a little acute septicæmia. When the abscess opens and is completely emptied, there is usually a prompt and almost complete relief from the symptomatic fever.

In case that the pus remains imprisoned or is only partially evacuated, and the suppuration and discharge continue to go on, there is usually marked constitutional disturbance, manifested by high temperature which varies abruptly in degree; at times running down almost to normal and again going up to 104° F., or to 104½° F.

Physical Signs.—These necessarily differ according to the stage of progress of the inflammation. During the stage of engorgement, a digital examination usually detects only swelling of the parts and tenderness on pressure, and if the examiner's sense of touch is very acute, increased heat may be detected; any effort to move the pelvic organs will usually cause pain. When the exudation takes place, the touch detects marked induration of the parts involved, and when it is complete, a well-defined tumor in both broad ligaments will be found, or it may be that this mass is found on either side of the cervix. If the tenderness when pressure is made upon the abdominal walls is not great, and there is not much tympanitic distention, the tumor can sometimes be accurately outlined by the bimanual examination. Usually, however, not much can be accomplished in this way because of the distention of the abdominal walls and the tenderness on pressure there.

The size of the tumor of course depends upon the extent of the exudation; in some cases it is not larger than a small orange, in others, both broad ligaments may be split up, and so filled with the exudate as to extend above the true pelvis and come in contact with the abdominal walls, so that the mass can be easily identified by abdominal palpation. This I have seen in but one case, though I have frequently seen the tumor on one side large enough to be distinguished in this way.

The extension of the tumor upward out of the true pelvis, is much more frequently seen in cellulitis following labor, and it is a physical sign characteristic of cellulitis as compared with pelvic peritonitis.

When the tumor occurs on one side, there is usually displacement of the uterus, that organ being pushed in the opposite direction. When both broad ligaments are involved, the uterus may be carried upward and forward. In cases occurring in the non-puerperal state, the uterus is often crowded somewhat downward; in all cases there is most marked induration of the parts presented to the digital touch, and also fixation of the uterus. When resolution terminates the case, a gradual diminution of the tumor will be observed from time to time. When suppuration and evacuation take place, there is a more prompt reduction in the size of the mass.

The physical signs sometimes change when suppuration occurs, but it is exceedingly difficult to detect the presence of pus in this location, although it is often important to do so. It is usually impossible, also, to detect fluctuation, because the abscess can not be touched at two points far apart. One must rely then upon the softening of the mass as felt by the index-finger, as the sign of suppuration.

This is liable to be simulated by œdema of the abscess-wall, but this can readily be distinguished by observing that the parts pit on pressure. It often happens, however, that one can not decide regarding the presence of pus, and if it is of great importance to so determine, the aspirating-needle should be employed.

Treatment.—During the first stage of cellulitis, treatment should be employed with the view of controlling the inflammatory process, and, if not able to abort the trouble, to limit or circumscribe it as far as possible. To accomplish this, perfect rest should be enjoined, and all pain relieved or made tolerable by the use of opium. The opium should be given by the mouth in doses sufficient to give relief, and be repeated often enough to maintain that relief. In case the stomach is so irritable as to refuse the opium, then it should be administered hypodermically.

There is at the present day some belief that quinine given in large doses often controls or modifies local and inflammatory action; this appears to be so in some specific inflammations like pneumonia, and it possibly may have some such controlling influence in cellulitis; if the stomach will admit of it, no harm can come from giving ten or fifteen grains of quinine in a day at the outset of pelvic cellulitis, and possibly much good may result. Opium, however, is the chief agent when there is much pain or restlessness in the first stage; the opium not only relieves the pain but also keeps the bowels at rest, which is quite desirable; the bowels, however, should not be kept too long confined; in fact, I make it a rule when a case is seen early, and the rectum is distended, to empty it by means of a mild enema, then the bowels should be kept quiet until the temperature and pulse come down and the pain subsides, when the bowels may be again moved by enema; this secures one evacuation between the stage of exudation and suppuration.

Local applications sometimes give the patient a certain amount of comfort, and, when such is the case, there should be employed warm poultices, or, better, flannels wrung out of hot water, and covered with oil-silk.

The exudation may be limited to some extent, it is claimed by some authors, by the use of counter-irritants; this, I think, is doubtful; therefore, if they are used at all, the milder agents, like mustard paste, may be employed. During all this time the patient should be nourished as well as possible. If a vigorous subject, less care in the way of diet is necessary; but, if feeble, an abundance of nourishing food should be offered. Prof. Virgil O. Hardon, M. D., of Atlanta, Georgia, has practiced aspiration with good results in the stage of serous infiltration. A case illustrating this mode of treatment will be given hereafter.

When suppuration occurs, the majority of patients will bear at that time sustaining means, nourishing food, full doses of quinine, and, in some cases, stimulants. To sustain the patient is the chief object at this stage.

If the case promises to end in resolution, that should be favored by counter-irritants, and the internal use of the preparations of iodine combined with tonics. When the abscess opens, and discharge follows, sustaining measures are all that is necessary.

If suppuration takes place, and the pus is not discharged, the sac should be more freely opened and drained through the vagina.

When the drainage is incomplete, because of the opening being too high up, an opening should be made at the most dependent part and the drainage-tube inserted. In case the imprisoned pus can not be reached through the vagina, and the patient's life is in danger from chronic suppuration or septicæmia, the practice of Lawson Tait may be adopted—that is, opening the abdominal walls, and draining the abscess with a drainage-tube in the abdominal wound.

The operation of opening the abdominal walls, and indirectly draining a pelvic abscess, involves all the difficulties and dangers of laparotomy. It is a very different thing when the abscess sac is adherent to the abdominal wall. Making an opening at the adherent point, and draining the sac, is little more than opening an ordinary abscess.

These are the principal points in the treatment of cellulitis; other details of the clinical history and treatment will be brought out in the history of cases.

ILLUSTRATIVE CASES.

A Case of Cellulitis uncomplicated, ending in Suppuration.—When this patient was twenty-six years old she gave birth to her second child. The labor, for some reason unknown to me, was tedious, and her physician delivered her with forceps. She progressed fairly well until the fourth day, when she had a chill, followed by fever, her temperature running up to 100° and 102½°. She also had pain in the pelvis and distention of the abdomen, but the lochia and milk secretion continued, although in diminished quantity. Her general condition remained about the same, except that she obtained relief from opium given by her physician until four days afterward. At that time I saw her, and found, on examination, a large mass on the left side, filling the upper portion of the pelvis, pushing the uterus to the right, and extending above the superior strait, so that I could distinctly make it out through the abdominal walls. This mass was so closely united to the uterus that it appeared to be a part of that organ, but was as large as the uterus itself. There was tenderness to the touch, marked induration, and yet the mass and the uterus were very slightly movable. Pain at this time was not great, and the patient only complained of a little local distress and discomfort, and said that she felt weak. At the same time, her pulse and temperature were both above 100.

There was also laceration of the cervix uteri, and the discharge was muco-purulent. At this time she had very little nourishment for her child, and yet there was a little. She was directed to have perfect rest, nourishing food, opium sufficient to keep her free from pain and to secure comfortable nights, with tonic doses of quinine.

The disinfecting vaginal douche which had been used was continued; tonic doses of quinine, with fluid extract of ergot, were ordered three times a day, and turpentine stupes were directed to be applied to the abdomen. One week later I saw her again in consultation, and learned from her attendant that but little change had taken place in her condition; the temperature was lower, her appetite had improved, there was almost no pain, and she felt stronger. On examination, there was little if any change in the tumor, the physical signs being about the same; the local discharge still continued, but was less purulent and offensive; the surface temperature varied from time to time; occasionally the skin was hot; at other times there was free perspiration. It was impossible at this time to detect the presence of pus in the mass in the pelvis. Five days afterward I saw her again, when I learned that she had had a chill, followed by a rise of temperature and pulse; she had also suffered from rather profuse sweating. At this time her general appearance was less satisfactory; she had a somewhat dusky hue of face, the pulse also was not as strong, and the milk had stopped entirely. Just before the chill her bowels had been moved by enema, and both patient and physician were disposed to attribute the increase in her trouble to the effect of the enema, but it undoubtedly was due to suppuration having begun.

On examination, the mass was felt to be softer at the most dependent part, and yet no distinct fixation could be made out. Quinine was given in somewhat larger doses, the vaginal douche was continued, and a little wine was added to the bill of fare.

A few days after this her pulse and temperature improved considerably. She had then very little pain, but a sense of heat, fullness, and dull aching in the pelvis. Four days after this there was a copious discharge of pus from the vagina, followed by marked improvement in the pulse, temperature, and general condition. The day following a marked diminution in the size of the tumor was noticed; there continued to be a discharge of pus in diminishing quantity for nearly a week, but during that time she improved in general condition very decidedly. The mass gradually diminished, and the uterus also progressed in involution, and her strength returned, so that she became anxious to get up. She was kept quiet, however, for some time, until involution was complete, and all that remained of the inflammation was a small, hard, but not tender mass on the left side of the uterus and in the broad ligament, evidently the collapsed or the contracted walls of the abscess.

From this time onward the improvement was steady and uninterrupted, and she was soon able to resume her duties, with the exception of nursing her child. At the end of two months from the time of the attack, she was quite well, and no traces of her trouble remained except a decided thickening of the broad ligament.

A Case of Cellulitis, ending in Resolution; the Cause Dilatation of the Uterine Canal by Sponge Tent preparatory to curetting.—A lady twenty-eight years of age, who had been married seven years, had suffered for some time with menorrhagia, caused by fungosities of the endometrium, and, although the cervical canal was quite empty, it was deemed necessary to dilate the canal with a sponge tent before removing the fungous growths. The sponge tent was introduced late in the evening, and remained during the following forenoon; the curette was used immediately afterward, and the abnormal growths completely removed. Twenty-four hours after this she began to have pain in the region of the left broad ligament, at the same time developing symptomatic fever, the temperature running up to 101½° F., and the pulse being accelerated. She also had a little nausea when the pain was most severe, with loss of appetite and some tympanitic disturbance of the bowels. On digital examination, made three days subsequently, a somewhat ill-defined mass was found in the right broad ligament, which increased during the following forty-eight hours until it attained the size of a hen's egg. There was a little displacement of the uterus to the right, but very little. This mass was quite tender to the touch, and could not be moved; neither could the uterus be moved without causing acute pain. Opium was given to relieve the pain, and the bowels were allowed to remain constipated for about four days. A vaginal douche of borax and warm water was used twice daily, removing a muco-sanguinolent discharge. The pain gradually subsided, and at the end of four or five days the bowels were moved; the fever also diminished, the appetite slowly returned, and about this time the mass began to slowly diminish in size. At the end of two weeks the patient was permitted to leave her bed and sit in her chair, but was not allowed to take any active exercise until after the next menstrual period. During that time she was confined to her bed, fearing that the inflammatory process might again be lighted up. After the period, which lasted about five days, she was permitted to resume her duties gradually, but was directed to rest quietly at the next menstrual period, which she did. Afterward, on examination, it was found that the mass in the broad ligament had wholly disappeared, there was no tenderness and no evidence of congestion or any other trouble, and her subsequent history shows recovery to have been complete.

I am quite sure that the diagnosis in this case was correct, and I am also satisfied that the cellulitis was caused by the treatment. The case occurred at a time in my practice when I knew less about the management of fungosities of the uterus, hence, I used a sponge tent before using the curette, an entirely unnecessary procedure. I know now that there was dilatation enough, but I followed the rules laid down in the books, and so employed the tent to the disadvantage of the patient. I am satisfied also that this case was due to sepsis, for at that time less was known about antiseptic surgery, and I have no reason to suppose that the sponge tent and the instruments used were surgically clean. This, I believe, from the fact that, although I have often used the curette since then and occasionally sponge tents, I have never caused cellulitis. Uncomplicated cellulitis rarely proves fatal; it is only when peritonitis supervenes that there is much danger in the early stages of the disease. The cases that end fatally do so usually in one of three ways: First, by acute septicæmia, which may take place immediately after suppuration occurs; second, by chronic septicæmia and exudation from prolonged suppuration in badly-drained cases; third, and very rarely, when the abscess opens into the peritoneal cavity, and at once sets up a septic and usually fatal peritonitis.

Pelvic Cellulitis following a Hæmorrhage into the Cellular Tissue.—A young, recently married lady, while very much fatigued from unusual physical exertion, was suddenly seized with acute pain in the pelvic region. When called to see her, I found her lying in bed suffering from severe pain and some rectal tenesmus; the pulse was somewhat accelerated, but the temperature was normal; the skin moist and cool. There was no constitutional disturbance beyond nervous excitation due to pain.

On examination, I found a tender point low down and to the right of the uterus, there was also a swelling which extended to the right and downward a little way, apparently between the rectum and vagina. The pain was relieved by opium, and on the following day the swelling was found to have increased and become denser, and yet, there was no symptomatic fever.

Two days later the physical signs remained the same, and there was also a marked discoloration or ecchymosis of the vagina, especially in the upper and posterior part of its walls. This discoloration, taken in connection with the history of the case, satisfied me that the case was one of hæmorrhage into the cellular tissues of the pelvis.

The pain gradually became less but there was still a feeling of fullness and pressure in the pelvis and an annoying rectal tenesmus, which made the patient feel as if great relief would be obtained if the bowels were moved. A mild laxative was given, followed by an enema, which secured a free evacuation of the bowels, but in place of relieving, this rather aggravated her sufferings. On the sixth day after the attack, the patient felt a little chilly, and soon afterward developed fever; there was also a slight recurrence of the acute pain in the pelvis. At this time the temperature was 102½° F., and the pulse about 110.

On the day following this, an examination was made, and the mass in the pelvis appeared to be softer than it was before; but this I think was due to œdema of the vaginal walls. The fever continued for several days and then gradually subsided, and the temperature remained about 100°.

The pain and general pelvic tenesmus continued, though not in a marked degree; her condition remained about the same during the following week, then the pain became more severe, the temperature rose a degree or more, and she was more restless and uncomfortable. Two days after this a discharge of pus from the vagina occurred, quite profuse at first, and continued in a modified way for a couple of days.

The discharge contained black specks which were found to be shreds of clotted blood. Forty-eight hours after the discharge first appeared, a careful examination by the touch was made in the hope of discovering the opening of the abscess, but without success; a very careful speculum examination was then made, and by the aid of the probe the opening was found to the right and a little below the cervix uteri. The opening appeared to be just above the mass, which extended down, apparently, between the vagina and the rectum. A uterine dilator of small size was passed through the opening into the abscess sac and slow dilatation made. When the opening was sufficiently enlarged to admit a curette, a large piece of blood-clot was removed; several strands of thick, prepared silk were introduced into the opening to keep up the drainage, and during the next few days considerable pus was discharged, together with shreds of old blood-clots.

As the opening showed no disposition to close, the drainage was abandoned, and from this time onward the discharge diminished and the swelling and thickening of the tissues also slowly disappeared. Finally, the discharge stopped altogether, and thickening and induration of the tissues gradually disappeared, and complete recovery took place.

Pelvic Cellulitis caused by Amputation of the Cervix Uteri.—This patient came into the hospital about eighteen years ago with a very much enlarged and eroded cervix uteri; in fact, the cervix seemed to be divided into two large, round masses, the surfaces of which were very irregular and so vascular that they bled profusely on touch. This was before Dr. Emmet had told us about laceration of the cervix uteri and its consequences, and I supposed that the case was one of incipient malignant disease. This diagnosis was concurred in by several of my colleagues, and amputation of the cervix was deemed the best mode of treatment, and the operation was performed after the method commended by J. Marion Sims.

In removing the posterior half of the cervix, I am satisfied that I went beyond the walls of the uterus into the cellular tissue; sutures were introduced to bring the flaps together and to hold them there, and the operation appeared to be quite a success. At the end of the second day the patient developed all the constitutional symptoms of local inflammation and soon afterward the physical signs of pelvic cellulitis were manifested.

The subsequent history of the case was that of ordinary pelvic cellulitis which ended in suppuration and discharge, which occurred at a point corresponding to the right angle of the junction of the flaps made in the amputation. The discharge soon ceased and all constitutional and local disturbance subsided, and the patient recovered from the acute attack.

She subsequently did rather badly, there was considerable contraction of the scar left by the amputation, and there was evidently some contraction of the parts involved in the cellulitis so that she suffered a good deal in after years with pelvic pain and dysmenorrhœa, and it became necessary to dilate the remaining portion of the cervical canal in order to give relief. This case is mentioned simply to illustrate cellulitis as it occurs after operations about the cervix uteri, and it no doubt was septic in its origin. The case was treated before the days of antiseptic surgery, and I have no doubt that I exposed my patient to all the septic influences possible in such an operation. Indeed, the management of the whole case was rather bad as it appears to me now, and I am inclined to believe that it was not at all malignant to begin with, and that amputation of the cervix was therefore uncalled for. Such a case now would be considered as a laceration of the cervix with areolar hyperplasia, and would be treated in the usual way.

A Case of Pelvic Cellulitis; the Abscess opening into the Rectum and Long-continued Suppuration occurring in consequence.—This patient was also seen in hospital; she gave a history of having had pelvic cellulitis seven months before admission. About five weeks from the time that she was taken ill she had discharges of pus from the rectum which were followed by marked relief. After this she continued to have repeated discharges of pus in the same way; for a few days at a time she would be comparatively comfortable, though never well; then she would have a little fever, with considerable pain, and then a discharge of pus, which would give relief for a few days. These remittent attacks of pain and fever followed by a discharge of pus, continued at varying intervals up to the time that I saw her. On digital examination, I found fixation of the uterus, with evidence of induration in both broad ligaments and around the cervix, above the vagina.

She was anæmic, emaciated, and had a somewhat cachectic appearance. She was placed under ether, and a most careful examination of the rectum made. The opening from the rectum into the cellular tissue was found about three inches up the rectal wall, by bending the probe into the shape of a hook. I was able to pass it from above downward and forward, showing that the opening ran from the rectum obliquely downward into the abscess about an inch. A counter-opening was made in the most dependent part of the sac through the vaginal wall; the opening was made with the thermo-cautery. This I believe to be the best method of making counter-openings in these old cases, as hæmorrhage can be avoided and the lymphatics closed by the cautery, which to some extent guards against septicæmia.

The opening in the vagina was maintained by small drainage-tubes which completely drained the abscess. The patient improved generally and locally, and after a time the drainage-tube was given up; a little discharge continued from the opening for several days, when it closed. The case did well, and was soon dismissed from the hospital, although there still remained considerable induration and thickening of the tissues of the broad ligaments. Presuming that her recovery would be effected in time, she was dismissed from the hospital; but returned in about three months with a rectal abscess, which, when it was opened, proved to be a rectal fistula. Evidently, the opening in the vagina had closed while that in the rectum remained, thus forming an internal rectal fistula. This was treated in the usual way and the patient finally recovered.

Pelvic Cellulitis; Abscess discharges through the Saphenous Opening.—In this lady's fourth confinement calcareous degeneration of the placenta was found. It was retained for a long time in spite of all the ordinary efforts used to deliver it; it was found necessary to detach it from the uterus, a very difficult task. She did very badly from the beginning, soon developing a metritis and cellulitis; she remained in a very precarious condition for about two months; the products of the inflammation formed a large mass on the left side which extended up to, and finally became adherent to, the abdominal walls.

Full details need not be given, suffice it to say, that at the end of twelve weeks an abscess opened through the inguinal canal. Much relief followed the opening and the copious discharge of pus, but it continued to discharge for weeks, and although she had improved after the opening of the abscess, she began to run down from this chronic suppuration, and her life was again despaired of. A probe was passed from the anterior opening and downward into the pelvis until its point could be felt on the left side of the cervix; there was still, however, a very thick wall between the vagina and the end of the probe. After faithfully trying the effect of careful washing out and drainage, without success, a counter-opening was made through the vagina by means of the thermo-cautery, and a drainage-tube carried through the opening in the abdominal walls down into the vagina. This tube was injected three times a day, and as the patient improved quite fairly the tube was drawn down toward the vagina, leaving the outer opening free. No discharge occurring at the abdominal opening and the wound showing a disposition to close, the tube was gradually withdrawn, and finally removed entirely. The discharge continued for some time after the removal of the tube, but finally ceased, and the patient recovered and has remained well ever since, a period of eighteen years.

Pelvic Cellulitis in which the Discharge was delayed, but finally relieved by Aspiration.—The history of this case has nothing peculiar in it except that it progressed as cellulitis usually does, until the time when the abscess was expected to discharge. It failed to do so, and the patient's general nutrition beginning to suffer, it was deemed advisable to use the aspirator; this was done and the abscess, which was in the right broad ligament, was emptied of about eight ounces of pus. This gave great relief, but in time the abscess filled again, and again it was aspirated, but this time before removing the needle, the sac was carefully washed out with carbolic acid and water. Great care was taken not to inject quite as much as the quantity of pus removed, for fear that by overdistending the abscess, some thin point in the sac might rupture and cause mischief.

There was considerable reaction after this aspiration, the pulse and temperature running up, but soon subsiding again. Nothing of importance occurred in the history of the case, and she recovered in due time.

A Case of Cellulitis terminating in Multiple Abscesses, cured by enlarging the Opening and breaking down the Walls of the Small Abscesses.—This case had a history during its early stages, quite in accordance with the ordinary progress of the disease, but after suppuration and discharge the patient was not relieved, and the suppuration continued. The opening was found to be a very small one, situated behind and to the left of the cervix uteri. After trying every possible means to improve her general condition without effect, the opening was enlarged by dilatation, the patient being anæsthetized; after dilatation, the finger was passed up into the mass, and the walls of several small abscesses broken down. This was rather easily accomplished because the uterus and the mass of inflammatory products were low down in the pelvis and within reach, and while the finger was passed through the opening, the other hand was placed upon the abdomen to act as a guide and to guard against breaking through into the peritoneal cavity.

After this, the discharge was very free, and a number of shreds of broken tissue were evacuated. Drainage was kept up and the parts washed out daily until the mass had greatly diminished and the discharge had almost subsided. The drainage-tube was then removed and the patient slowly recovered.

A Tedious Case of Cellulitis causing Septicæmia from a Very Small Point of Suppuration; treated by Laparotomy and Drainage; Recovery.—This case was seen in consultation with my friend Prof. Jewett, who gave me the following notes: The patient was thirty years old, and was confined March 3, 1885, with her seventh child. She had ante-partum hæmorrhage and inertia of the uterus, which rendered it necessary to deliver with forceps at the superior strait. The nurse was incompetent, drunk, or stupid, or all three, and allowed the patient and her bed to remain filthy for two days. At the end of the third day, the patient developed cellulitis in the left broad ligament; there was also a circumscribed peritonitis limited to the location of the cellulitis. At the beginning of the disease, the temperature ran up to 103° and the pulse to 140; this elevation was attained on the 7th of March, and from that time until the 15th, the temperature ranged between 100° and 102°, and the pulse between 90 and 110. There was a marked difference between the morning and evening temperature. From the 15th until the 20th, the constitutional disturbance subsided, the local inflammation also diminished, and there was every reason to suppose that the cellulitis would end in resolution. From the 20th to the 28th she was apparently convalescent, and was able to walk about, but on the 29th she had a relapse, the temperature running up in the afternoon to 104°. The following morning it was down to 97°, and from this onward to the 18th of April her temperature was most extraordinary in its variations. On the 4th and 5th it was 105° in the afternoon and 100° in the morning; from the 6th to the 11th it ranged between 100° in the morning and 103° and 104° in the afternoon. All this also in spite of quinine and other recognized antipyretics. From this date to the 18th, the temperature became more irregular, occasionally dropping down to 98½°, and suddenly and at irregular times running up to 103° and 104°.

It was thought that this variation of temperature was due to septicæmia, and yet no pus accumulation could be detected in the pelvis. Prof. Jewett practiced aspiration with negative results, but subsequently made a number of appointments for further explorations; but the patient was an exceedingly intractable one, and her friends had no control of her, so that he was unable to carry out his wishes in this regard.

The physical signs during all this time since the relapse remained about the same. The patient by this time was exceedingly anæmic, the skin was of a bronze hue, and the digestion and general nutrition very poor, and altogether her condition was critical.

On May 2d she submitted to an anæsthetic, and Prof. Jewett performed laparotomy. He made an incision through the abdominal walls directly over the tumor in the broad ligament, and, after making a small puncture in the tumor, opened up the cavity with the finger; no pus was found, and not more than a teaspoonful of septic fluid was evacuated. The cavity was drained and irrigated with a bichloride solution for about four weeks, when it closed completely.

The temperature never rose above 101° after the operation, and, after the first three days, it became normal, and remained so ever afterward. She rapidly gained in her general health, and in five weeks had completely recovered.

Pelvic Cellulitis ending fatally from Septicæmia.—About sixteen years ago, while in charge of the lying-in department of the Long Island College Hospital, one of my cases developed a metritis and cellulitis after confinement. The case progressed in the usual way, differing in no respect from many cases of the kind, except that the products of the cellulitis were unusually great. The metritis subsided, and the cellulitis, which was located in the left broad liga ment, went on to suppuration, and, while I was looking for the abscess to discharge, the patient began to show signs of septicæmia.

There was, no doubt, a large accumulation of pus in the broad ligament, but, as we were unable by physical signs to determine that, I unwisely abstained from exploring the abscess. All constitutional treatment known to us was carefully employed, but the patient died. On post-mortem examination, a very large abscess was found in the left broad ligament, and nothing more. The peritonæum covering the abscess was congested, and there was much subserous œdema, but not the slightest evidence of any peritonitis.

This case, like many others, illustrates very well two important points: First, that cellulitis occurs without the slightest pelvic peritonitis accompanying it, and this fact tells strongly against those who make no distinction between the two affections; and, second, if this case had come under my observation in recent years, when I appreciate the value of aspiration and abdominal section and drainage, as taught by Lawson Tait (all honor to him for this!), the case might have been saved.

Great progress has been made in the management of cellulitis within the last few years in the employment of aspiration, counter-openings, drainage, and abdominal section and drainage, as the above cases have illustrated.

Acute Cellulitis treated by Aspiration in the Stage of Serous Infiltration (by Virgil O. Hardin, of Atlanta, Georgia).—"The patient was twenty-four years of age, and had borne a child three months before. The history of the patient showed that her menses had always been of normal character up to her pregnancy, and that she had never suffered from any symptoms which would indicate pelvic disease of any kind. Since her labor she had had tenderness of the abdomen and pain in walking and in micturition. Her general health, however, had been good. On the day before I saw her she was seized with pain in the back, pelvis, hips, abdomen, and thighs. This pain was acute and excessive. Micturition and defecation became very painful, especially the latter. She had a slight chill, followed by high fever, thirst, and complete loss of appetite. When seen by me, she was in bed, tossing and moaning with pain, which was referred principally to the pelvic region. Pulse, 120, temperature, 101°, skin hot and dry, face flushed, tongue coated. Vaginal and rectal examination were rendered impossible by excessive tenderness of the parts. The following morning she was fully anæsthetized, and a complete examination effected. The vagina was hot and dry. The cervix was lacerated on the left side. The womb was low in the pelvis, and was pushed forward against the bladder. In the posterior fornix, and occupying the whole space between the cervix and the rectum, could be felt a rounded, bulging mass, which had a boggy, œdematous feeling. By a finger in the rectum this mass could be outlined, and felt to extend upward about an inch. No fluctuation could be detected, and, when pressed by the finger, the mass could not be displaced upward. Considering the condition to be that of pelvic cellulitis in the stage of serous infiltration, I decided to attempt to draw off the serum from the cellular tissue, hoping thereby to abort the disease and prevent the formation of solid plastic exudation, with possibly a subsequent abscess. Accordingly, an aspirator-needle was thrust into the tumor from the vagina at three different points successively, and about an ounce in all of serum tinged with blood was withdrawn. The tumor was then found to be so softened and diminished in size as to be scarcely perceptible to the touch. A quarter-grain of morphine was given hypodermically, and the patient ordered to remain perfectly quiet in bed, and take only liquid diet. When seen twenty-four hours later, she had had a good night's sleep, the pain in the pelvis was almost entirely gone, defecation was no longer painful, appetite had returned, the pulse had fallen to 80, the temperature to 99°, and the patient begged to be allowed to get up. The mass in the posterior fornix could be felt only as a slight thickening. Two days later the patient was apparently in her usual health."

Pelvic Cellulitis, with Certain Complications, which, so far as I know, have not been noticed or described heretofore.—The patient was thirty-seven years of age, and the mother of six children. She was confined in June, and was fairly well for five days. She got up on the fifth day, and tried to attend to her housework. Four days later, while about the house, she was taken with severe pain in the pelvis, and was obliged to take to her bed again. This much of her history was obtained from the patient.

She was seen for the first time by Dr. J. H. Raymond about six weeks after her confinement, and he learned that she had had no regular medical care, and but very poor nursing, her poverty depriving her of necessary attention.

From the history and physical signs, the doctor made the diagnosis of pelvic cellulitis of the left broad ligament. The temperature at that time was nearly normal in the morning, but rose to 101° or 102° at night. There was marked constitutional disturbance, such as generally obtains in long-continued suppuration or septicæmia.

The doctor urged her to go to the hospital, but she declined until August, about ten weeks after her confinement. During the interval from the time that she was first seen until she entered the hospital she was confined to her bed with her left thigh flexed upon the body, and the leg upon the thigh. When she was admitted to the hospital she was very anæmic, had night-sweats, and had the general appearance of a tubercular patient. The flexion of the leg and thigh continued, and there was false anchylosis of the joints. The tumor in the pelvis was much smaller than it had been, but there were pain and tenderness in the left iliac region, extending up to the lumbar region. The temperature ranged from 100° to 103°, being very irregular in its rising and falling. There was no point in the pelvis where pus could be detected, and, although there was some swelling in the left side of the abdomen, no signs of pus could be found after repeated examinations. She was able to take food and stimulants fairly well, and every means was employed to reduce the temperature and improve her strength, but without any favorable result.

Hopes were entertained that the location of the suppuration would be found, and that relief might be obtained by aspiration or other means of evacuation. In spite of the constitutional treatment, she gradually declined, the anæmia became very marked, and the temperature increased, frequently being 104°, and sometimes a fraction higher. She appeared to be doomed to die of septicæmia, and, as a last resort, it was decided to make a laparotomy, in the hopes of finding the source of the septicæmia. Immediately before giving the ether her temperature was 104$\frac{3}{5}$°, pulse, 140, and feeble.

The anchylosis of the knee- and hip-joints was with difficulty roken up, and then a more careful exploration of the left iliac egion was made. There were swelling and hardening of the wall f the abdomen on that side, but not to any great extent. An asirating-needle was introduced at a number of points in the hope of inding pus, but without avail. The abdomen was opened, and a nost careful exploration of the pelvis was made by the touch. The eft broad ligament was considerably thickened and much less elastic han it should have been, showing the effect of the inflammation, vhich had subsided. Not the slightest sign of any point of supuration could be found, but, by the bimanual touch, with the fingers of one hand in the abdominal cavity, and those of the other on he outside, I detected obscure fluctuation, indicating that an abscess r sinus extended along that side of the abdomen. The location of he pus having been clearly marked, the wound in the abdomen was closed, and an incision was made in the side down to the pus. It was found that the pus cavity was very small at its lower and most superficial end. It would not admit the little finger. This accounted for the fact that it was not found with the exploring needle. Passing a probe from the opening made upward, I found that the sinus was wider above, and extended up to the diaphragm. The cavity was washed out, and a drainage-tube introduced.

Dr. Palmer, who aided in the operation, conducted the after-treatment, and the following facts are taken from his record, as kept by the house-surgeon:

The patient reacted well under the effect of morphine and atropia, given hypodermically at the end of the operation, and again in three hours. Whisky with hot water was given four hours after the operation; she retained it well, and from that time onward the morphine and whisky were given to meet requirements. Five hours after the operation the temperature was 99½°, pulse, 128, respiration, 28. Two hours later the pulse went up to 100½°. The night was passed very comfortably, but she required morphine and whisky in large doses, not altogether because of the pain or exhaustion, but largely from the fact that she was used to both. For years she had been a drinker, and, during the long illness previous to the operation, she had taken morphine. At five o'clock on the following morning the temperature was 102°, but in two hours it came down to 99°.

From this time onward her progress was favorable, at times the temperature went up one or two degrees, but came down when the pus sac was washed out. She improved in strength but the suppuration high up in the cavity continued, but in a much less degree.

Her lung-trouble progressed slowly, but she seemed doomed to pulmonary phthisis. One month after the operation there was still a little discharge from the wound, but she did not apparently suffer from that to any extent, but her cough was worse, and the lungs not improving. At this time she returned to her home. The final results I have not yet obtained.

The following case was similar to the above, but terminated fatally, and a post-mortem examination revealed the exact nature of the lesions.

The patient was thirty-seven years old, and had been confined of her fifth child four months previous to the time that I first saw her in consultation with Dr. R. L. Dickinson. From the history that we could gather, she had fever from the day after her confinement, and had been sick ever since. She was emaciated, and her skin dry and dusky; the temperature ranging from 101° to 102°; she had but little appetite, and was constipated. She rested on the right side with the legs and thighs flexed, and complained of severe pain in the right groin and leg. Owing to the fixed position of the right leg and the great pain which she suffered in moving, a physical examination was not easily made. The uterus was apparently normal and movable, but high up, at or above the brim of the pelvis, on the right there were evidences of inflammatory products. The diagnosis of abscess in the false pelvis was made, causing septicæmia. She was taken to the hospital, and explorations were made with the aspirator, in the hope of finding the exact location of the pus, but with negative results. Laparotomy was performed by Prof. Charles Jewett. The pelvic organs were normal, except that there were evidences of a former cellulitis in the upper portion of the right broad ligament. The presence of pus was made out in the right iliac and lumbar regions; the abdominal wound was closed, and an opening made above the right groin into the abscess. It was found that the abscess cavity extended upward along the spine for twelve inches. The subsequent treatment consisted in washing out the abscess cavity, and supporting the patient with nourishment and stimulants. She did not rally well, but gradually failed, and died the third day after the operation.

The autopsy showed that the abscess cavity extended from the right broad ligament upward behind the kidney and to the right of the spinal column to the diaphragm. The psoas muscle was involved in the abscess, but there was no bone-disease, and it was the opinion of all who attended the autopsy that the disease began as a cellulitis of the right broad ligament.

A case similar to the above came under my observation twelve years ago. Upon being admitted, the patient gave a history of cellulitis following confinement. She was in a very low condition from septicæmia. I found signs of suppuration in the left iliac region, and, on making an incision, I found a large abscess, which extended upward to, if not beyond, the diaphragm.

The patient had a cough with purulent expectoration, but no well-defined signs of any disease of the lungs. After washing out the abscess sac with carbolic acid and water, the patient declared that she could taste the acid; this led me to suspect that the abscess had opened into one of the larger bronchi; water colored with carmine was injected, and the matter expectorated afterward was colored with the carmine.

She died of exhaustion, and at the autopsy it was found that a sinus extended up behind the diaphragm and opened into a bronchial tube.

CHAPTER XXXIII.

PELVIC PERITONITIS.

The peritonæum which covers the pelvic viscera of the female differs in no respect in its anatomical construction from the general peritonæum, and its function is the same. It differs only in

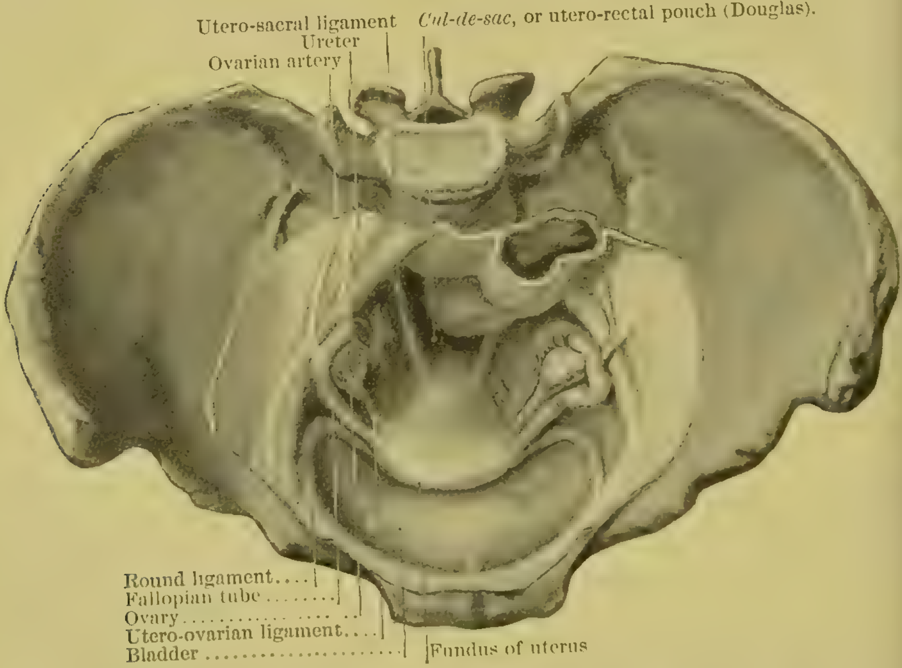

Fig. 233.—The pelvic peritonæum as seen on looking into the brim.

the organs which it covers, and in the fact that there is in this region a direct communication and union between the mucous and serous membranes at the opening of the Fallopian tubes.

From the fact that the peritonæum is a continuous membrane, one would naturally suppose that an inflammation beginning at one point would incline to extend to the whole membrane, so that general peritonitis would be the rule in the pathology of inflammation of this membrane. It is a fact, however, that the pelvic peritonæum becomes the seat of inflammation very often and without any general disposition to extend to the abdominal peritonæum. The two affections, then—that is, pelvic peritonitis and general peritonitis—while they are the same in their pathology, differ so in their clinical history and causation as to render them two separate and distinct affections.

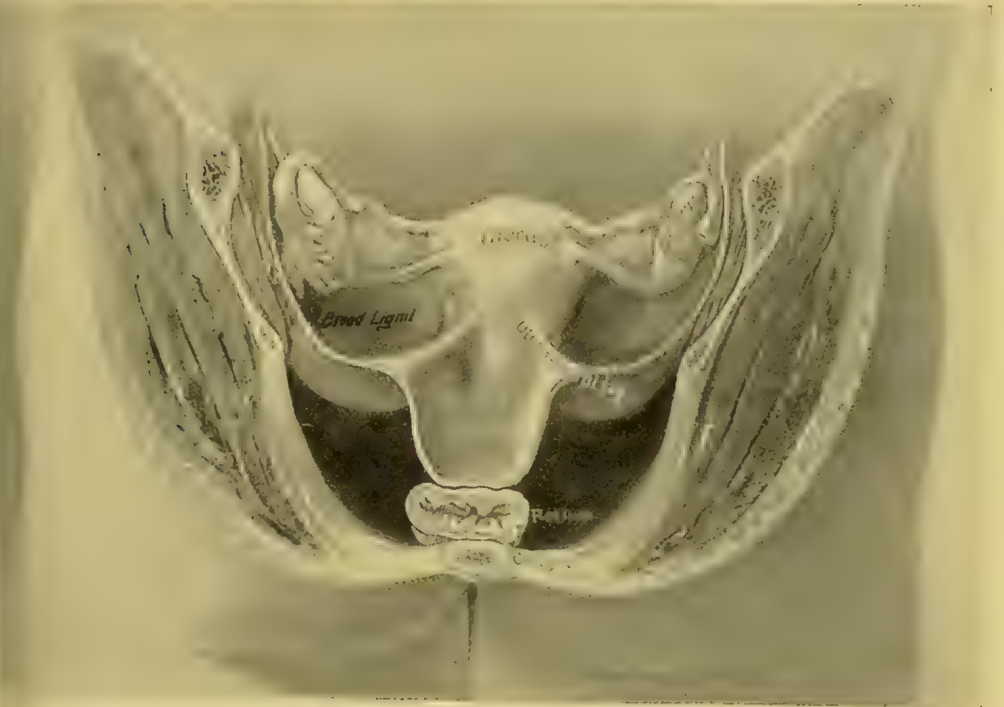

FIG. 234.—The reflections and pouches of the pelvic peritonæum seen from behind. In the center it dips into the *cul de sac* of Douglas. The lateral pockets or shelves are shallower. (Modified from Hodge, American Text-book of Obstetrics.)

There is a form of peritonitis which occurs after parturition, in which the inflammation begins in the uterus and extends to the general peritonæum, and is known as metro-peritonitis; but this also differs entirely from pelvic peritonitis, which occurs far more frequently than either general peritonitis or metro-peritonitis.

The pathology of pelvic peritonitis is the same as in inflammation of serous membranes generally. There is first subserous congestion, followed by a transudation of blood serum, and then an exudation of plastic material, or the higher organized constituents of the blood. Ordinarily, this ends the formative stage of the inflammatory process, and the products of the inflammation are disposed of first, by the absorption of the serous transudation and the organization of the exudate. This organization simply consists in the development of blood circulation, either in or beneath the exudate, sufficient to maintain it in a vitalized condition and prevent its further degeneration and disintegration.

The peculiar characteristic of this exudate is to form adhesions to adjoining tissues and to undergo contraction in its after-life, so that following an attack of pelvic peritonitis, the parts in the grasp of the exudate become adherent, and are often drawn out of their normal position by its contraction. Occasionally, but rarely, the inflammation of this serous membrane goes on to suppuration. When this form of peritonitis takes place, pus accumulates usually in the sac of Douglas; there it sometimes is walled in by an exudation of lymph which unites the two folds of the peritonæum which form the sac. Occasionally, too, small abscesses may be formed in the exudate which is thrown out around the ovaries and Fallopian tubes.

There is a wide range in the degree of severity in cases of pelvic peritonitis; in some, a circumscribed spot of inflammation may occur which gives rise to a little discomfort at the time, and, passing off, leaves no suspicion that there ever had been an inflammation there. These cases we know occur from the fact that the traces of inflammation are found post-mortem.

From these circumscribed and exceedingly mild attacks, we find all grades of severity, up to the most marked, where the whole pelvic peritonæum is involved and suppuration occurs, and the case terminates fatally. In this respect, pelvic peritonitis strongly resembles pleurisy, the milder cases representing the circumscribed, dry pleurisy, and the more severe corresponding to that of pleuritic empyema.

There is also another form of pelvic peritonitis, in which there is an unusual transudation of serum which accumulates in the sac of Douglas, and corresponds to the ordinary pleurisy with effusion.

Judging from the number of cases of peritonitis met in practice, and also from observations made post-mortem, this is one of the pelvic diseases which occurs perhaps as frequently as any; certainly, it is much more common than pelvic cellulitis uncomplicated. It no doubt occurs most frequently in the progress of other pelvic affections, like cancer of the uterus, pelvic cellulitis, salpingitis, etc., but under these circumstances it is a secondary affection, and in that form need not be discussed here.

In less severe cases the exudation gradually disappears, and the mobility and functional activity of the pelvic organs may be again restored and the patient may be considered as having recovered. But this takes a long time before it is accomplished. When pelvic peritonitis terminates fatally, it usually does so because the inflammation has gone on to suppuration, and may be called a purulent peritonitis, and in that case the patient may die in a few days from the time of the attack, either from shock or acute septicæmia, or both, or inflammation may extend to the general peritonæum, and in that way sacrifice the patient.

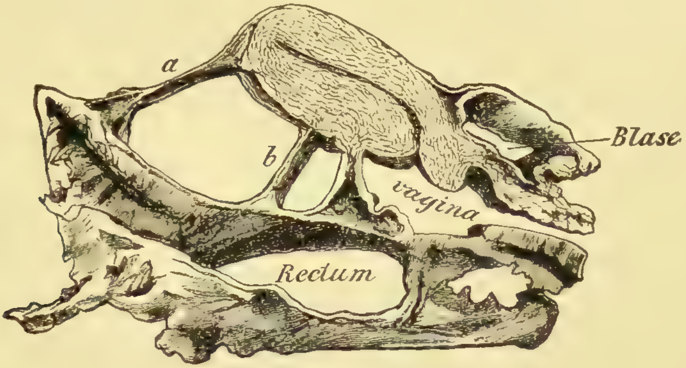

FIG. 235.—Retroverted uterus bound back by peritonitic adhesions; *a*, *b*, adhesions. (Winckel.)

Causation.—In regard to the causes of pelvic peritonitis, we find that non-parous women are most liable to it, especially those who suffer from imperfect development of the sexual organs and derangement of their functions, like dysmenorrhœa, for example.

The immediate causes of pelvic peritonitis are of three kinds: First, where it is secondary, and evidently caused by some affection or inflammation of some of the other pelvic viscera, like ovaritis, salpingitis, and endometritis. Second, traumatic influences, such as injuries of any kind, imprudence during menstruation, and all surgical operations or treatment. In those who have suffered long from displacements and flexions of the uterus and general irritability and congestion, injuries appear to be sufficient to set up a peritonitis, like the passing of a uterine sound, or the application of caustics to the uterus. Third, specific causes, such as the escape of septic material from the Fallopian tubes, in cases of endometritis and salpingitis, but more especially, the virus of gonorrhœa. In a large number of cases the cause will be found in this specific virus; this is the reason why pelvic peritonitis is such a common affection among prostitutes.

The duration, termination, and after-consequences of pelvic peritonitis, depend largely upon the extent of the inflammation and the cause which gives rise to it. In some cases where the exudation is limited recovery will take place in a few weeks, and but little after ill effects will be noticed, except occasional pain from time to time in the region of the exudate. In other cases where the whole pelvic peritonæum is involved, the fimbriated extremities of the Fallopian tubes become involved in the exudate, and are virtually destroyed. If this includes both sides, the function of the ovaries and tubes is arrested because of the damage to the structure.

Degeneration of the ovaries often follows under these circumstances; sometimes they become inflamed and succulent; at other times they become atrophied, due, no doubt, to the pressure of the contracting exudate and the interruption of the circulation in them; in short, in some of these cases, the adhesions and the quantity of exudation so destroy the anatomical relations that on post-mortem it is almost impossible to recognize the tissues or organs. A mass of tangled adhesions and products of inflammation covering the uterus and broad ligaments, is about all that can be made out.

When such patients live, they suffer greatly from pelvic pain and dysmenorrhœa, if the function of menstruation is not arrested, as it sometimes is, by the destruction of the ovaries.

Symptomatology.—This varies according to the severity of the attack; in average cases there is a well-defined symptomatic fever, the pulse being characteristic of inflammation of the serous membranes, being small and wiry, and running up from 110 to 130; the temperature is variable, often running to 103° F. and 104° F., and in severe cases to 106° F.

At first, the skin is usually dry and hot; there is marked derangement of the digestive organs, nausea and vomiting often occurring; sometimes in the severer cases vomiting of that greenish material so common in general peritonitis, occurs. There is usually marked tympanitic distention, and the patient prefers resting quietly on the back with the limbs drawn up, a position which seems to be the easiest; there is usually a considerable disturbance of the nervous system, the patient being anxious, restless, and the facial expression showing anxiety and dread. Sometimes there is delirium, but not usually, and when it does occur, I am inclined to think it shows that the ovaries are affected; at any rate, and in several cases that I have seen, where I have every reason to believe that the ovaries were also inflamed, there was great mental excitement, and temporary insanity in some.

The pain in the pelvis is usually acute, much more so than in cellulitis, and there is great tenderness to the touch; the pelvic vessels are generally affected, and there is marked rectal tenesmus, and, if the peritonæum in front of the uterus is involved, there is vesical tenesmus also; in fact, this vesical irritation is often an exceedingly annoying symptom.

The physical signs obtained by a vaginal examination during the first stage simply reveal tenderness with some apparent thickening of the roof of the pelvis. This may be limited to one portion of the pelvis, but in well-marked cases it extends throughout. When exudation has taken place, complete fixation of the uterus is found, and the roof of the pelvis, as felt through the vagina, presents the extreme hardness which is characteristic of peritonitis, and has been called the dealboard hardness by some. If much lymph is thrown out, especially if it is associated with considerable serum, a mass will be found behind the uterus occupying the sac of Douglas. At no time, however, do the products of this form of inflammation extend above the superior strait, unless as an exceedingly rare exception; in case that the disease goes on to the formation of pus, a well-defined tumor may be found in the sac of Douglas, and if this pus is discharged, the intense hardness at that point may disappear in part; but if the entire exudation is lymph, it remains hard for a long time. There is almost always a displacement of the uterus as well as a marked fixation, and this fixation is likely to remain also; as contractions occur subsequently the position of the uterus may become changed, and not only is the organ thus displaced, but it is fixed in this position.

The difference between the physical signs of pelvic peritonitis and other diseases of the pelvic organs, such as cellulitis and pelvic hæmatocele, will be given in treating of the signs of the latter.

Treatment.—The objects to be attained in the treatment of pelvic peritonitis, are first, to control or limit the inflammation so far as possible, and to relieve the pain which is usually very great; by accomplishing the latter, we do all that is possible to effect the former, the means employed to relieve pain, fortunately, having the greatest control over the inflammation. The great remedy then in the earliest stages of pelvic peritonitis, is opium; Alonzo Clark was the first to discover the value of this agent in general peritonitis, and to him we owe most of our knowledge of the management of this affection, and it is equally available (that is, the opium treatment) in pelvic peritonitis.

The quantity of opium to be given should be measured by the effect obtained; the pain should be relieved and kept in abeyance by the regular administration of doses sufficient to accomplish this object; when it is possible, opium or morphine should be given by the mouth, because in this way the patient can be kept more uniformly under its influence; it often happens, however, that the stomach is too irritable to retain it at the outset; the morphine should then be given hypodermically until the stomach is quiet. In some cases where there is marked pelvic tenesmus, the opium may be given by the rectum; it should then be given in solution or enema, because if administered in suppositories it is too slightly absorbed.

Sometimes in giving the opium in this way it will aggravate instead of relieving the pelvic tenesmus, which is often an exceedingly annoying symptom. In many cases the patient has a constant desire to urinate, but all efforts to do so only increase greatly the suffering; this induces the patient to resist the desire, so that there is a vesical tenesmus with retention; under these circumstances great relief can sometimes be given by the careful use of the catheter. Warm applications may be made to the abdomen in the form of fomentations; counter-irritation, also, is often useful, which may be obtained by the use of mustard-pastes, turpentine stupes, etc.

The bowels should be kept quiet for a few days by the use of opium until the acute stage has passed, when they should be relieved by the mildest possible means. If the patient is seen at the very onset of the attack, and the rectum is found to be distended, it should be emptied at once by enema; during the early part of the first stage, if the stomach is, as it usually is, very irritable, but little will be accomplished in the way of giving nourishment; the thirst may be alleviated by giving ice or minute quantities of effervescing waters. If there is great prostration, a little champagne and Apollinaris water or carbonic water may be given to relieve the thirst and sustain the patient. As soon as the stomach will admit of it, nourishing food, mostly fluid, should be given; the beef-extracts, digested milk, and gruel will usually answer the best purpose. At the end of the acute stage, when the pain is subsiding or relieved, and the temperature and pulse are down, then the opium can be greatly reduced in quantity, or given up entirely if the patient sleeps well; usually, however, small doses will be required at night to secure rest.

The next object in the treatment is to favor a further limitation of the plastic exudation, and to promote the absorption of the inflammatory products; this can be accomplished, if at all, by the use of counter-irritation. Small blisters applied in the iliac regions, and repeated, often give the patient relief from disturbance, and apparently favor the absorption of the inflammatory products. The best method of employing blisters under these circumstances is to apply two, one on each side, to be kept there until the skin is thoroughly vesicated, then puncture the vesicle and let out all the serum and allow the cuticle to fall down upon the cutis, and then apply over this absorbent cotton, and allow it to remain undisturbed until healing is complete, which usually takes place in from two to four days; blisters may again be applied in the same way. During this time the patient should be sustained by nourishment and tonics, quinine being one of the most reliable agents. When all acute symptoms have subsided and there is no evidence of any serum or pus accumulated in the pelvis, the further disposition of the inflammatory products may be favored by the use of iodine. The tincture of iodine may be applied through the speculum to the roof of the pelvis, that is around the cervix uteri and upper part of the vagina, and iodide of iron may be given internally. Counter-irritants from time to time should be continued, one part of croton-oil dissolved in two parts of sulphuric ether to which are added three parts of tincture of iodine, makes a good application for keeping up continuous irritation; this should be painted over the lower portion of the abdomen, and repeated when the fine eruption which it produces has disappeared.

These remedies should be changed after a time to the iodide of potassium or the bichloride of mercury with chloride of iron, the latter being the most valuable as a tonic and alterative. While there are still some of the products of inflammation remaining in the pelvis, or at least for a long time after the subsidence of the acute inflammatory symptoms, the greatest possible care should be taken to guard the patient against undue labor; standing, walking, or riding may produce a relapse, and hence, the patient should be made to carefully feel her way in sitting up and in taking exercise; especially should this care be insisted upon at the menstrual periods. No rules can be laid down with reference to this except that any exercise which excites pain should be avoided; short stages of exercise, followed by rest in the recumbent position, should be adhered to, a little more liberty being given every day, in case it does not produce pain.

All exercise of the sexual functions should be prohibited until pain and tenderness have subsided. In case there is an accumulation of serum or pus in the sac of Douglas, this should be removed by aspiration; if pus is found, the cavity should be washed out with a weak solution of carbolic acid and water, or of bichloride of mercury, and if this does not relieve the pain, an opening may be made and drainage established, but this is usually unnecessary.

ILLUSTRATIVE CASES.

A Typical Case of Uncomplicated Pelvic Peritonitis.—A lady twenty-five years of age, who had been married for two years, and was sterile, began to menstruate first at fifteen, and had also had dysmenorrhœa slightly for the first years of her adult life, but it was much aggravated after her marriage. She was subject to attacks of pelvic pain, though not severe, after much exercise. At the time of the attack now under consideration, she was menstruating, and went out into company, and, I believe, engaged in dancing, and took cold on her way home. In the night she was seized with violent pain in the pelvic region, with nausea and vomiting. She was seen early in the morning, and her temperature was found to be 102° F., and her pulse 120; it was also observed that she was a feeble-looking person of a tubercular diathesis; there was much tenderness to the touch in the lower portion of the abdomen, and also considerable tympanitic distention. On digital examination, there was evidently an increase in temperature, with congestion and marked tenderness in the region of both broad ligaments and behind the uterus. There was no fixation apparent nor hardening of the tissues, but, owing to the increased tenderness, it was difficult to make a very critical examination. The rectum was distended with fecal matter. A hypodermic injection, consisting of ten minims of Magendie's solution of morphia, was given, and warm water was injected into the rectum; the immediate effect of the enema and evacuation was to increase the pain, and in two hours afterward it was necessary to give five more minims of Magendie's solution hypodermically; this gave considerable relief, but it did not produce sleep. In the middle of the day she was found to be still restless, with an anxious and somewhat pinched expression, and expressed herself as fearful of some dangerous trouble. Another hypodermic injection was given, because she still had nausea, but no vomiting; late in the evening she was still in much pain, having come partially out from under the influence of the opium; she was still nauseated, and her temperature was 103½° F., and her pulse over 120; she complained of some headache, felt hot and feverish, and yet she was in a perspiration. Fifteen more minims of Magendie's solution was given, which secured for her several hours' sleep. Early in the morning she was found wakeful and restless, and the pain had returned; her stomach still being irritable, another ten minims of Magendie's solution of morphia were given; during the night, while awake, small pieces of ice were given, which were grateful to her, but she was still thirsty, and begged for a large drink of cold water; she was given half a wine-glass of cold Vichy every half-hour when she desired it; she retained some of this, and in the forenoon took a little clear coffee, which she relished and retained. She still continued to suffer from nausea, great abdominal tenderness, and considerable pelvic pain; she also complained of a very urgent desire to urinate, but any effort to do so gave her so much pain that she resisted the desire; the nurse was directed to pass the catheter, which she did, and drew off less than half a pint of urine of a remarkably dark color. At night she again had fifteen minims of the solution of morphia, which gave her a few hours' sleep, when she again awoke with pain; ten minims was then given, which carried her through the night fairly comfortable.

On the third day after the attack, upon digital examination, the parts of the portion of the pelvis within reach were found to be hard, and the uterus fixed. The hardness and fixation extended entirely across and behind the broad ligament and the uterus; a diagnosis of pelvic peritonitis was then made without hesitation. The nausea at this time was less marked, so that she retained the Vichy-water and coffee and tea, and occasionally a little beef-tea; but these were administered in small doses, care being taken not to give her the Vichy immediately before or after she took any of the others.

Every little change in the temperature was observed at this time. It had required from forty-five to fifty minims of Magendie's solution to keep her comfortable during the twenty-four hours up to the end of the third day; after that the opium was given by the mouth, twenty minims of Squibb's liquor opii comp. were given every three, four, or six hours, according to the disturbance or pain which she had, and from twenty-five to thirty minims at bed-time. This was sufficient to keep her tolerably comfortable, and to secure a sufficient amount of sleep in the night and an occasional nap during the day. About this time she suffered very much from tympanitic distention; occasionally she could raise gas from the stomach, but this gave her very little relief. On the fifth day six grains of quinine, dissolved in sulphuric acid, and added to an ounce of sirup of acacia and a little warm water, was given by enema; this was retained, and produced partial relief from tympanitic distention.

About a week from the time of the attack the pelvic peritonæum was evidently covered with a marked exudation, especially that portion forming the sac of Douglas, while the fixation and induration involved the entire roof of the pelvis; it was most marked behind the uterus, extending down to a point on a level of the surface of the cervix uteri.

On about the eighth day a marked improvement had taken place in her general condition; the temperature was 101½° F., and the pulse a little above 100; her tongue was still thickly coated, but was beginning to clean off on the end and sides; the nausea had mostly subsided, but she had no appetite; she was able, however, to take a fair amount of fluid nourishment—beef-extract, digested gruel, and milk, with a little tea and coffee from time to time; she still had thirst, and took considerable water. We were able at this time to reduce the quantity of liquor opii comp. about five drops every three or four hours, with twenty-five drops at bed-time. At this time we began the use of small blisters, and continued to keep the lower portion of the abdomen in a state of irritation for the next ten or twelve days; she was also given a pill three times a day, composed of one grain of quinine, one tenth of a grain of extract of belladonna, one half grain of comp. extract of colocynth, and one fourth grain of ipecac; this, after a couple of days, excited some peristaltic action of the bowels, and, after an enema of soap-suds, the bowels moved. This relieved the tympanitis considerably, and, although she felt greatly distressed immediately after the movement of the bowels, she was apparently better for it.

All this time she had a good deal of irritation of the rectum and bladder, and a constant sense of fullness and distress in the pelvis, with pain that varied very much in severity. From this onward she suffered very little, although obliged to keep quiet in bed; she continued to take a fair amount of nourishment and solid food, such as rare steak and a chop, which with toast and milk, were added to her bill of fare.

The quantity of opium was diminished until she only took one dose at bed-time; the pills were continued, and the bowels moved every third day by enema; the temperature had now come down to 100° F., and the pulse to 95, but there was still very little apparent difference in the condition of the pelvis. This line of treatment, including the counter-irritation, was continued until the end of the third week; at that time she was permitted to sit up a little in bed, and was able to turn from side to side without much discomfort. She continued in this way for three days longer, when the pain began again, and the pulse and temperature ran up; her stomach became again disturbed, although there was no vomiting, and the opium had to be given in small doses more frequently, in order to relieve her—in short, there was every appearance of a lighting up of the acute trouble, but the temperature did not go beyond 101° F., or the pulse beyond 110, and she was exceedingly irritable, nervous, and despondent at this time; the menstruation then came on, and after a day her pain began to subside a little, and at the end of the third day her condition was about what it was before the relapse took place. This undoubtedly was simply a dysmenorrhœa from a lighting up of the inflammation.

After the menstrual flow subsided, she improved in her general condition very decidedly, and, at the end of the fifth week from the beginning of the attack, she was able to sit up a little while in bed, and to be occasionally lifted into her reclining-chair. Her temperature and pulse were nearly normal, but she was quite weak, and still had some disturbance in the region of the pelvis; milder forms of counter-irritants were employed, occasionally using a mild mustard-paste, and sometimes painting with the tincture of iodine; she was then put under general tonic treatment, including quinine and iron.

The bowels were kept regular by the pills which were prescribed before. At this time there was still marked fixation and induration in the location of the pelvic peritonæum, and from this onward the treatment consisted in good, generous nourishment, wine, and tonics; the iodide of iron alternated with bichloride of mercury and chloride of iron was continued off and on for about six months; at the end of that time her health was about as good as it was before she was taken ill, although she suffered more from her dysmenorrhœa than formerly, and was obliged to keep in bed during the menstrual period. About this time an examination was made when the induration had partly disappeared, but not wholly; there was still fixation of the uterus, and efforts were now made to relieve her dysmenorrhœa, which was evidently due to an anteflexion of the body of the uterus, by enlarging the canal by gradual dilatation; the first attempt at this, however, gave rise to so much pain and suffering that no further efforts were made in that direction at that time. A vaginal douche of hot water was ordered, but that did not give her any apparent relief, nor did it appear to influence the disposition of the inflammatory products. Tincture of iodine was applied around the cervix uteri and upper portion of the vagina once a week for a month or two, and this appeared to be beneficial; at least she improved while this was being employed, but I presume that the constitutional medication had most to do with her progress—in fact, my experience with this case and many others has satisfied me that local treatment in old cases of pelvic peritonitis does harm ten times to once that it does good. She was kept upon her general tonic and alterative course of treatment for six months after suspending all local treatment, and then it was found that there was a marked improvement in the local condition; as soon as the slight mobility of the uterus was established, the induration and fixation much more rapidly diminished.

The patient passed from under my observation, but returned again in two years to be treated for dysmenorrhœa, and I then had an opportunity of examining her carefully, and found considerable mobility of the uterus, and also of the broad ligament; the marked induration had wholly disappeared—in fact, the only trace of her former peritonitis remaining was a small mass in the most dependent part of the sac of Douglas; this did not appear to give her any trouble; there was also less anteflexion of the body of the uterus. I was then able to treat her for her dysmenorrhœa, and succeeded in relieving her to some extent, but not wholly. Four years after I heard of this patient, and she had still maintained fair health, but suffered slightly at her menstrual periods.

A Case of Circumscribed Pelvic Peritonitis of the Mildest Character.—A young lady of somewhat delicate organization, who had suffered from irregular and painful menstruation, was seized about the time of one of her periods with violent pain in the left ovarian region; she was out at the time the pain came on, and I believe was overfatigued; she returned home and went to bed, and I saw her several hours afterward; she then had tenderness on deep pressure in the left iliac region and also had pain there of an acute character. Her temperature was below 100° F., but her pulse was over 100; she was somewhat nervous and restless; I gave her a dose of bromide of sodium with a few minims of liquor opii comp., and ordered it to be repeated during the night if she did not sleep.

One more dose was necessary to give her a comfortable night, and in the morning when I saw her there was no constitutional disturbance except a loss of appetite and some flatulence; her pulse was a little rapid and there was still pain and tenderness, but not marked, in the left side. In the evening of that day her menstrual flow began and continued normally though more free than usual; this improved her condition somewhat, and although she continued in bed for about a week on account of the return of pain upon trying to sit up, still she made a good recovery, and was around as usual the week following. For a number of weeks she had occasional attacks of pain and tenderness on that side, especially at her menstrual periods.

This attack passed off, and she was in fair health until three years afterward, when from exposure she contracted double pneumonia, of which she died. The physician who attended her at that time obtained a post-mortem examination, and, knowing that she had been a patient of mine at former times, invited me to be present; nothing of interest being found in the thorax I suggested the propriety of examining the pelvic viscera in the hope of determining the pathological conditions which gave rise to her irregular and somewhat painful menstruation. I had at this time entirely forgotten the attack above described, and only remembered it when we found the products of the pelvic peritonitis on the left broad ligament. The fimbriated extremities of the Fallopian tube were matted together by the old exudate, and the peritonæum covering the outer portion of the tube and extending downward showed evidence of an old inflammation; the ovary, however, did not appear to be affected, except that two or three fimbriæ of the tube were adherent to it. This case illustrates the circumscribed mild form of pelvic peritonitis which occurs quite frequently no doubt, but is overlooked, except when found at post-mortem.

Septic Peritonitis Terminating Fatally.—This case illustrates the other extreme from the one just related. A strong, healthy servant-girl had leave of absence on Saturday, and staying out too late, tried to save time by crossing a field instead of taking the road home; and upon jumping a fence near the house, she was suddenly seized with the most violent pain in the pelvis; she reached home with great difficulty, and was helped to bed by her fellow-servants; nausea, and vomiting came on, and she became pale, faint, and covered with cold, clammy perspiration; the physician of the family, Dr. Woodruff, was sent for in the night, and by the judicious use of morphine hypodermically and stimulants administered by the rectum, he succeeded in bringing her out of her state of partial collapse. Her temperature then rapidly ran up to 105° F., and her pulse to 130; there was extreme tenderness of the abdomen and distention; the vomiting continued so persistently that it was impossible to administer nourishment or medicine by the mouth. The physician made a diagnosis of peritonitis which he believed to be general, and I saw her with him in the morning and, concurring in his diagnosis, we continued the use of opium, but her pulse had improved and the stimulants were suspended. The temperature and pulse continued very high and her general appearance was more like that of a case of puerperal peritonitis than any other, but there was still some hope entertained of saving her until Tuesday afternoon when she began to vomit that greenish material so often seen in general peritonitis.

Her pulse became feeble and very rapid; her temperature in the vagina ran up to 106° F., and she appeared like one passing into a state of collapse. She became more and more depressed, and died of shock on Wednesday morning. The case being somewhat unusual, a grave question was raised as to the causation; and hence a most careful post-mortem examination was made.

On opening the abdomen we found that a few coils of the small intestine had dipped into the upper part of the pelvis, and were adherent by recent soft exudate to the upper part of the uterus. The sac of Douglas was found nearly full of pus, and the whole pelvic peritonæum was covered with the products of acute inflammation. On carefully removing the pus and some soft lymph from the sac of Douglas and broad ligaments, a recent opening was found in one of the ovaries which led to a cyst not larger than a hazel-nut; in this cyst were found a few drops of brownish-looking fluid which was preserved for microscopical examination.

The general peritonæum, except that covering the intestine which rested upon the uterus, was perfectly normal. Nothing else abnormal was found in any of the organs of the body; the heart was rather below the average size, and so were the blood-vessels; beyond this all was normal.

It is clearly evident that this girl had small ovarian cysts, the contents of which were highly septic, and when the rupture occurred this fluid set up peritonitis, which being highly septic in character, developed the violent attack which overwhelmed the patient's nervous system.

A Case of Pelvic Peritonitis caused by Gonorrhœa, and followed by Pyosalpinx.—This lady was twenty-six years of age, and had always enjoyed very good health until she was married. Two years after her marriage she was suddenly taken with acute vaginitis and urethritis; she then came under my care, and I then made a diagnosis of gonorrhœa and subsequently procured unmistakable evidence from her husband that such was the nature of the attack.

The vaginitis and urethritis yielded promptly to treatment, and she was dismissed apparently well, but returned to state that she still suffered from uterine leucorrhœa; I then found a well-marked cervical endometritis with some remaining vaginitis of the upper portion of the vagina. While she was under treatment for this she suddenly developed a pelvic peritonitis, which was not especially severe but in which there was considerable exudation, as indicated by the fixation and induration of the pelvic organs. Under ordinary treatment she progressed fairly well, but the case was unusually tedious. At the end of the year I considered her well, but she still had some pelvic pain occasionally, although the products of the inflammation had been almost entirely disposed of, so that there was mobility of the pelvic viscera and very little hardening of the parts except in the sac of Douglas where there still remained some of the old exudate which presented a somewhat irregular, nodulated condition to the touch. At this time she was again taken ill with the symptoms of another attack of pelvic peritonitis; the pain and tenderness on this occasion, however, were limited to the left side, and a tumor was soon developed which was elastic to the touch; this led me to suspect that this was a case of salpingitis instead of peritonitis, and when the acute symptoms subsided somewhat, I endeavored to confirm my suspicions by aspirating the tumor; I found pus and was able to draw off about an ounce and a half of it; the sac soon filled up again, and she suffered a great deal of pain and constitutional disturbance, evidently due to a slight septicæmia.

As the case was one of long duration, she became discouraged with my treatment at this time, and on the advice of friends, went to the hospital. I learned afterward, that while in the hospital she was operated upon, the distended tube being removed after the manner of Lawson Tait.

A Case of Pelvic Peritonitis, followed by Permanent Displacement of the Uterus, Dysmenorrhœa, and Cystitis.—This was a married lady, about twenty-nine years of age, who had suffered most of the time from dysmenorrhœa and sterility, caused by anteflexion of the body of the uterus with slight retroversion. During the treatment for this malformation of the uterus she was attacked with pelvic peritonitis, the exciting cause being a rather forcible effort to correct the retroversion. The pelvic peritonitis ran its ordinary course, and terminated in recovery; but afterward the uterus was found in a markedly retroverted condition, and bound down to the posterior wall of the sac of Douglas; the bladder was also drawn backward with the uterus, and held in that position. This gave rise to dysmenorrhœa quite as marked as that from which she suffered before her peritonitis. The malposition of the bladder caused by the adhesions rendered it impossible to completely empty that organ, and the partial retention of the urine developed a very troublesome cystitis.

All efforts to restore the uterus and bladder to their normal positions were without avail. The dysmenorrhœa was partly relieved by treating the cervical endometritis, which she also had, and dilating the internal os a little. The cystitis was controlled by long-continued local treatment, but she still suffered from some pelvic tenesmus, and, in fact, remained something of an invalid during the five or six years that she remained under my observation.

Pelvic Peritonitis, which went on to Suppuration, the Pus accumulating in the Sac of Douglas; treated by Aspiration; and Recovery.—This patient was a lady who had married and had borne two children, became a widow, and married a second time, and who had contracted gonorrhœa, which led to a severe attack of peritonitis. There was nothing peculiar in the clinical history of the case, except that it was very severe, but she progressed fairly well up to the time when the acute symptoms should have disappeared. Her temperature and pulse continuing high, and her general nutrition showing evidence of some septic influence, it was presumed that pus had been developed somewhere in the pelvis, and, as there was a large tumor or a well-defined mass in the sac of Douglas, the aspirating-needle was introduced in the hope of finding the location of the suppuration.

Over two ounces of sero-purulent fluid were drawn off, which improved the patient's condition almost immediately; she had less pain afterward, her pulse and temperature improved, and her general nutrition also; this improvement, however, was only for a short time, when the former symptoms returned, and aspiration was again practiced with the result of finding a small quantity of pus. The sac was at the same time washed out with a solution of bichloride of mercury, and from this onward she did well, although she did not fully regain her original health; she still had attacks of pelvic pain at times, and active exercise usually brought on pelvic tenesmus. The last time that she was examined, about a year and a half from the time of the pelvic peritonitis, there was still considerable fixation of the pelvic organs and induration, showing that the products of the bygone inflammation had not by any means been all disposed of.

CHAPTER XXXIV.

PELVIC HÆMATOCELE.

Pelvic hæmatocele is, as the term indicates, an accumulation of blood in the pelvis, or, more strictly speaking, in the sac of Douglas, or else in the cellular tissues of the pelvis. Of course, the accumulation of blood is merely the result of some other lesion, and consequently pelvic hæmatocele is secondary to the lesion which gives rise to it. It is produced so often as the result of rupture in ectopic gestation that it has been doubted of late whether it ever occurs under any other circumstances.

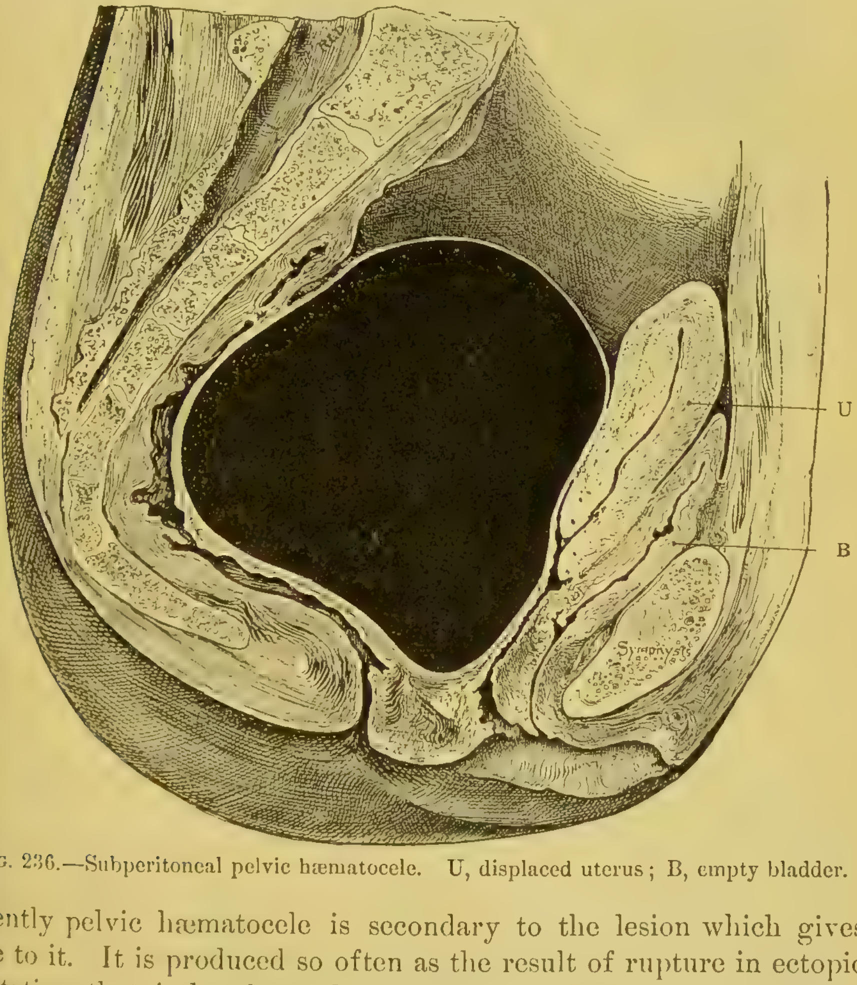

Fig. 236.—Subperitoneal pelvic hæmatocele. U, displaced uterus; B, empty bladder.

There are two forms of pelvic hæmatocele, distinguished according to the location of the accumulation of blood: subperitoneal pelvic hæmatocele, or that in which the hæmorrhage occurs in the cellular tissues (Fig. 236), and intra-peritoneal hæmatocele, in which the blood accumulation is in the pelvic cavity—that is, in the sac of Douglas (Fig. 237).

The subperitoneal variety is not always a very serious affection, while the intra-peritoneal variety is one of the most dangerous diseases which comes under the observation of the gynecologist; therefore the former will be dismissed with a few remarks later, while the most of what follows will refer to the intra-peritoneal variety wholly.

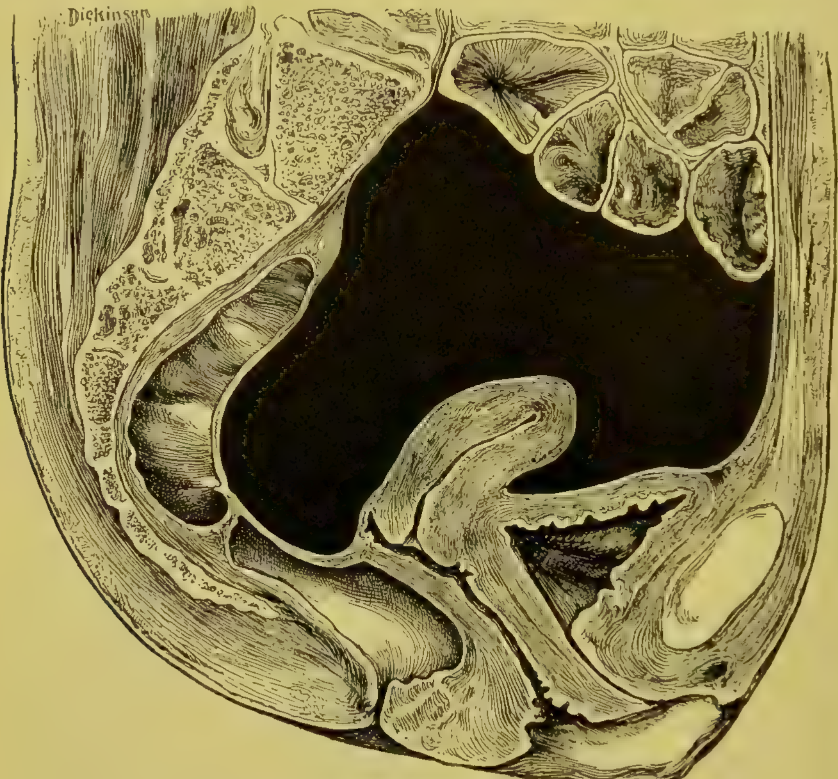

Fig. 237.—Intra-peritoneal pelvic hæmatocele.

The sources of the hæmorrhage giving rise to this affection which have so far been accurately determined are from rupture of blood-vessels of the ovaries or veins of the broad ligaments, and from rupture of an aneurism of some of the pelvic arteries, reflux of blood from the uterus or Fallopian tubes, and general transudation from the smaller blood-vessels in certain conditions of the blood, such as that of purpura, for example. Rupture of the sac in cases of extra-uterine pregnancy has also been mentioned as a source of hæmorrhage, giving rise to pelvic hæmatocele; but as extra-uterine pregnancy is a matter wholly by itself, it need not be considered in this connection. It will be seen from this that the conditions which give rise to hæmorrhage may all be classed under two heads: first, some condition of the blood-vessels which favors their giving way, and, second, the conditions of the blood which favor hæmorrhage, such as we find in persons of the hæmorrhagic diathesis.

The extent of the accumulation depends somewhat upon the size of the ruptured vessels. If the hæmorrhage is extensive, the loss of blood and shock may cause a fatal termination in a few hours. This shock is due to the impression made upon the peritonæum by the sudden effusion of blood, which acts as a foreign body. If this does not occur, and the hæmorrhage ceases, then pelvic peritonitis—sometimes general peritonitis—supervenes, and the products of the inflammation are thrown around the blood-clot, and in this way it becomes walled in. If, again, the patient survives the acute peritonitis, the serous portion of the blood is slowly disposed of by absorption, and in time the solid clot softens down, and is also disposed of in the same way; and, again, the patient may recover with the pelvic organs damaged by the inflammatory products, which remain and behave very much as in simple pelvic peritonitis. Occasionally, however, it happens that, in place of the blood-clot being disposed of in this way, it breaks down, and suppuration of the products of the peritonitis occurs, and death ensues from septicæmia.

This, then, gives three well-defined stages in the progress of pelvic hæmatocele: First, the stage of hæmorrhage; second, the stage of pelvic inflammation; and, third, the stage in which the clot is disposed of by absorption, or breaks down, and gives rise to suppuration.

The extent of pelvic peritonitis, and the subsequent disposal of the clot, or the degree of suppurative action which may take place, depend somewhat upon the quantity of the blood accumulation, and also upon the patient's general condition at the time, and the character of the blood. In case the patient is not in vigorous health at the time of the hæmorrhage, and if the hæmorrhage is great, the shock is more likely to prove fatal; or, if that does not take place, then the extent and character of this inflammation, and the tendency to decomposition and suppuration, are rendered greater in case the blood is in any way abnormal.

A limited quantity of normal blood in the sac of Douglas does not necessarily give rise to very great trouble, but we can readily suppose that, if blood is abnormal, as in the case of scorbutus or purpura, then it is more likely to be irritating, and hence the greater will be the inflammation and tendency to suppuration. Figs. 236 and 237, illustrate the two varieties of pelvic hæmatocele, classified according to location.

Causation.—The causes of pelvic hæmatocele are necessarily predisposing and exciting. The predisposing causes are certain changes in the blood-vessels of the pelvis, overdistention of the vessels which enfeebles their walls, and degeneration of the walls of the blood-vessels, which renders them more easily ruptured under extra pressure. Any one of these conditions of the blood-vessels may be produced by continued hyperæmia or, more especially, engorgement. It is well known that congestion on the venous side of the circulation tends to degeneration of tissues of all kinds, and the walls of the blood-vessels prove no exception. Hence, in cases of long-continued congestion of the pelvic organs from any cause, such as obstruction of the portal circulation, imperfect involution after parturition, or in persons whose occupation compels their continued standing or sitting, the strength of the walls becomes impaired, and they are liable to rupture. On the other hand, in certain abnormal conditions of the blood, such as that found in purpura or scorbutus, there is a tendency to hæmorrhage from the small vessels under extra pressure. It follows, also, that the predisposition to hæmorrhage will be most marked during the period of ovarian activity, and also at the menstrual period.

The exciting causes of pelvic hæmatocele are, in a word, anything which can produce overdistention of the blood-vessels, sudden checking of the menstrual flow, maintaining the erect position for any great length of time, violent exercise and overexertion, and the like, injuries or falls, and when the hæmorrhage comes from the Fallopian tubes or the uterus, it is caused by some obstruction of the cervical canal or the Fallopian tubes.

Symptomatology.—In the majority of patients who have this affection the hæmorrhage is often preceded by symptoms indicative of some pelvic affection, but these need not necessarily be sufficiently marked to call the attention either of the patient or the physician to them; so it may be said that the symptoms of pelvic hæmatocele are developed suddenly. The symptoms, of course, differ as the disease progresses, each stage having its own characteristic manifestations. When the hæmorrhage occurs, there is first severe pain in the pelvis, followed soon after by all the evidences of shock, such as faintness, coldness of the extremities, pallor, and cold, clammy perspiration, a feeling of nausea, and sometimes vomiting.

If the temperature is taken at this time, it will be found to be subnormal, and the pulse irregular and rapid, although sometimes it is slow and feeble.

In a short time to these symptoms are added well-marked pelvic tenesmus, including vesical and rectal tenesmus and tympanites. If the hæmorrhage stops and the patient recovers from the shock, then inflammatory symptoms are developed.

These constitutional and local symptoms are exactly the same as those observed in peritonitis, because they are due to the peritoneal inflammation which usually starts up about forty-eight hours after reaction from the hæmorrhage. If the patient passes through the inflammatory stage and the blood accumulation is disposed of by absorption, the symptoms will then be altered to a modified pelvic tenesmus with occasional pain of a mild character and a general malnutrition, indicating some source of a mild form of septicæmia. On the other hand, if suppuration and breaking down of the blood-clot take place, the constitutional disturbances, as indicated by high temperature, rapid pulse, and deranged nutrition, will show the septicæmia which usually takes place under those circumstances.

Physical Signs.—In the stage of hæmorrhage there are simply tenderness and distention of the sac of Douglas, indicated by a mass which fluctuates on pressure; the tumor is soft, smooth, and uniform.

After coagulation has taken place the mass becomes solid but is, still soft and yielding to the touch; the uterus is displaced, usually upward and forward, so that the cervix will be found just behind or above the symphysis. The rectal touch will also show that the tumor presses upon the bowel; abdominal palpation made after the tympanitic distention has subsided will often show the mass extending up to the superior strait, and sometimes higher, and in one case that I saw, the blood-clot extended upward halfway to the umbilicus.

After inflammation takes place this mass becomes surrounded above with the products of the inflammation, which increase the density of the tumor and also give it a more perfect fixation. After the inflammation has subsided and the serous portion of the blood has all been absorbed and the solid clot has undergone considerable contraction, the mass, that was originally smooth to the touch, now becomes quite irregular. As the case advances still further and the blood-clot breaks down and suppuration occurs, the mass may become softer and give the impression of obscure fluctuation to the touch. The great difficulty which the diagnostician encounters is to distinguish between pelvic cellulitis, pelvic peritonitis, and hæmatocele. It is also stated that pelvic hæmatocele may be confounded with retroversion of the uterus, extra-uterine pregnancy, fibroid tumors, and inflammation of a small ovarian cyst which is lodged in the sac of Douglas, and hydro- or pyo-salpinx. There is very little likelihood of confounding so grave an affection as pelvic hæmatocele, the clinical history of which is so marked, with any of the above-named conditions, except it might be an acute inflammation of an ovarian cyst, located in the sac of Douglas, or a Fallopian tube, very greatly distended with serum, pus, or blood. In either of these conditions—except the latter—if a diagnosis could not be made, and it was important at once to do so, the use of the hypodermic syringe used as an aspirator would settle the question definitely.

Treatment.—During the stage of hæmorrhage this consists in using means to arrest the hæmorrhage, relieve the pain, and sustain the patient against the shock and loss of blood. To control the hæmorrhage the patient should be placed on the back with the head and shoulders slightly elevated, in order that the blood as it accumulates in the pelvis may by its own weight make pressure upon the rupture in the vessel. Cold applications to the abdomen have been recommended, but usually are not well borne. Pressure made by applying a compress and bandage is more likely to do good. To relieve the pain and sustain the patient, morphine given hypodermically is the most reliable and valuable of all remedies; under the circumstances the opium acts as a stimulant as well as a relief to pain. In case the shock is great and liable to prove fatal, stimulants should be used hypodermically or by the rectum; but in many cases the rectum will not retain them owing to the irritability caused by the hæmatocele.

This line of treatment is efficient in the subperitoneal variety, and in the intra-peritoneal also in case the ruptured vessel is small; but in the latter it is necessary, in the majority of cases, to open the abdomen and stop the hæmorrhage by ligating the ruptured vessels.

When the inflammatory stage begins the treatment should be the same as that already advised in cases of pelvic peritonitis, and if the case progresses favorably the treatment should be continued on the same principle. If, however, suppuration takes place and the patient is placed in danger of septicæmia, the question arises how to relieve that condition. There are two methods, either or both of which may be employed if the location of the pus can be reached through the vagina; aspiration may be practiced, and if that gives relief it may be repeated if need be; if, however, this fails, the needle may be again introduced until the pus is reached, and being left there as a guide, a larger opening may be made and drainage established.

ILLUSTRATIVE CASES.

A Case of Pelvic Hæmatocele uncomplicated.—A lady of somewhat phlegmatic temperament who was also chlorotic, had suffered all her life from dysmenorrhœa in a marked degree, and also scanty menstruation as a rule, although at times this was more free. She had been twice married, the last time for eight years, but had never been pregnant. In taking her previous history at the time I first saw her, I found that she had symptoms of some former pelvic disease, probably general congestion as indicated by her dysmenorrhœa, leucorrhœa, and pelvic tenesmus which was aggravated on walking.

She had lived a somewhat indolent life taking very little physical exercise. When I saw her first I learned that on the last day of her menstrual flow she had been riding and walking more than usual, as she had some visitors whom she was entertaining by taking them about the city.

While getting out of her carriage she slipped and fell on the sidewalk; she was taken with pain in the left side of her pelvis, and had to be helped into the house, and immediately went to bed; her pain increased in severity, and she became very faint and nauseated; I saw her about two hours after this slight accident, and found her suffering from partial shock; her pulse was exceedingly feeble and rather rapid; her temperature was 97½° F., and her skin was cold and clammy; she was sighing frequently, and had an expression of extreme anxiety and distress; she had vomited frequently and was exceedingly nauseated; she complained in a low whispering voice of a violent pain in the vaginal pelvis. There was considerable tympanitic distention of the abdomen with marked tenderness in the epigastric region. On digital examination I found considerable tenderness, but not as much as might have been expected.

There were signs of fluid in the sac of Douglas, but this was easily displaced by the touch; a diagnosis of pelvic hæmorrhage was made, and hypodermic injections of morphine were given sufficient to relieve her pain; a little brandy-and-water was also administered at first, but this she almost immediately rejected; an abdominal bandage and compress were applied without giving any distress for two or three hours, but at that time she complained of its tightness, and it was necessary to remove it; bottles of hot water were applied to the feet and limbs and also to the arms, which were kept under the bed-clothing. All this gave her relief from pain to some extent and the shock did not apparently increase, and yet she showed very little disposition to rally. About three hours afterward some brandy and beef-extract were given by enema, and repeated at intervals of two or three hours for some time; the hypodermic injections of morphine were also repeated as often as every three hours during the first twelve hours. During this time she was given a grain and a half of morphia altogether. She then began slowly to recover from her shock, the hæmorrhage evidently having stopped; her pulse became more rapid and a little fuller; she breathed more naturally, and her skin became warm; she also had less of that extreme faintness and depression; still she remained nauseated although she was able to retain very small quantities of brandy and Seltzer-water and beef-extract; the pain however was not any less except when controlled by the morphine. In addition to this she complained of marked pelvic tenesmus, especially of the bladder and rectum. She described this feeling as one of great fullness, weight, and pressure in the pelvis, which she fancied would be relieved by free evacuation of the bowels. She remained in this condition with very little change; taking opium freely and very little nourishment for about forty-eight hours; at that time the physical signs showed that the sac of Douglas was filled with blood which was now beginning to coagulate as shown by the less pelvic fluctuation on touch. Her temperature now rather rapidly increased, running up to 103° F., her pulse became more rapid and fuller; the pain also increased, and nausea and vomiting again returned. She was now very tympanitic and had acute tenderness on touch in the lower part of the abdomen; in short, she had all the symptoms of acute pelvic peritonitis with unusual marked constitutional disturbance, owing no doubt to the general depressed condition due to pelvic hæmorrhage.

On the fourth day there were well-defined evidences that the products of the pelvic inflammation were being developed; there was much greater hardening of the parts, and the mass in the sac of Douglas was solid or more solid as indicated by the touch. From this onward the physical signs were those of a pelvic peritonitis with an unusual accumulation in the sac of Douglas.

The progress of the case from this time was that of a severe pelvic peritonitis, and the treatment was the same as has already been described, hence nothing further need be said on that subject. At about the end of the third week the physical signs were the same, except that on examination a mass appeared behind the uterus which was somewhat irregular, small depressions and elevations being detected here and there; the temperature and pulse had both come down, and yet remained above 100; the patient was now able to take a fair amount of nourishment, and her bowels were moved, but with the greatest possible difficulty; laxatives and repeated enemata were given each time that an evacuation was obtained, and she also suffered great distress when the bowels moved. About this time she began to show decided malnutrition; she had lost considerable flesh, was pale and rather slightly bronzed looking, and her skin was dry and ill conditioned, giving the impression that the absorption of the serous portion of the blood was probably causing a mild form of septicæmia. From this time onward her progress was exceedingly slow but entirely satisfactory under tonics, nourishing diet, and mild counter-irritation over the hypogastric region; she gradually regained her strength. The pain and discomfort in the pelvic region had become very trifling except when she tried to take exercise. There was no change in the physical signs except that the mass in the sac of Douglas had greatly diminished in size, and the uterus which had been pushed upward and forward close to the pubes, had returned in part toward its normal position. The hardening of the pelvic roof and the fixation of the pelvic organs remained about the same.

It is needless to follow the progress of this case from day to day; suffice it to say that she made a very slow recovery, that at each menstrual period she suffered great disturbance, and that for a long time was unable to walk or ride without suffering pain. Tonics, alteratives, and nourishing diet were given which improved her general condition.

Ten months after the attack there were still signs of an excessive exudation in the pelvis, and also the remains of a blood-clot in the sac of Douglas; still, from this time onward she was able to enjoy life in her own somewhat indolent way, but could not walk or ride without suffering more than in former years. A year and a half subsequently I had the opportunity of examining the pelvis, and found that there was still considerable fixation of the pelvic organs, and also some hard, irregular, small masses in the sac of Douglas, but she did not appear to suffer very much from these, and her general health was fairly good.

Pelvic Hæmatocele; Evacuation of a Clot; Recovery.—A Frenchwoman, occupied as polisher in a watch-case factory, where her duties required her to occupy a standing position all day long, was suddenly taken ill while at work; violent pain, followed by faintness, came on while she was at work. She was carried from the factory to her home near by, and one of my assistants was called to see her. He attended to her immediate wants, and saw her again afterward, when he made a digital examination, and found a fluctuating mass in the sac of Douglas. On the second day he gave me a detailed history of the case, and we came to the conclusion that she must have had a pelvic hæmorrhage; the inflammatory action soon set in after she rallied from the shock which occurred, and was very severe at the onset of the disease, and she was again in a most dangerous condition. Being poor, her surroundings were very unsatisfactory, and, by advice of the doctor, she was removed to the hospital; she was admitted about ten days after the time that she was taken ill. At that time the pelvis appeared to contain one solid mass, so that nothing could be distinguished except a somewhat shortened vagina and the cervix uteri, which was curled up and firmly fixed behind the pubes. Her bowels were very much distended, and she suffered extremely from pain and tenesmus; her general condition was very wretched, indeed, and, as it was impossible to move the bowels, the question arose, What could be done to relieve the extreme pressure in the pelvis which threatened to destroy the organs and tissues, and prove fatal? I had the extreme good fortune to secure the counsel of the late Prof. William Warren Greene, and we decided to evacuate the blood-clot in the hope of thereby saving the life of the patient; accordingly, an incision was made through the posterior vaginal wall into the most dependent part of the tumor, which extended well down into the middle line of the pelvis; a large blood-clot was found, which was broken up and evacuated, and the cavity cautiously washed out. No hæmorrhage of any amount followed, and she was very much relieved. I succeeded then in moving the bowels, which, while it distressed her at the time, subsequently gave her relief. The improvement lasted but a little while, however, for she soon developed a violent septicæmia, and it now appeared as if she certainly must die; she became delirious, her pulse was extremely rapid and feeble, her temperature was 105½° F., and she was bathed in clammy perspiration; her breath also had that peculiar sweetish odor characteristic of septicæmia or pyæmia.

There was a free discharge of pus at this time from the wound.

Every effort was made to sustain her by stimulants and quinine, given by the mouth and rectum also, and the sac was washed out carefully and frequently with boracic acid and water. For two days it seemed as if she might die at any time.

A free and profuse diarrhœa came on, and lasted for several hours, and, at a consultation held by the surgical staff of the hospital, all agreed that she had very little chance of recovery. The treatment was thoroughly carried out, and soon the blood-poisoning began to diminish, the sac became smaller, the discharge less free, and, finally, the wound closed, and she recovered from all but the products of the inflammation, and these remained slightly diminished up to the time that she was discharged from the hospital, three months from the time that she was admitted. When she left the hospital her general health was fairly good, but there was still fixation of the pelvic organs, and marked induration extending across the pelvis behind the broad ligament and uterus. I found out afterward that she took care of her household after her return from the hospital, and about six months afterward returned to her occupation in the factory, where she remained at work when last heard of, two years from the time she was first taken sick.

A Case of Subperitoneal Hæmatocele; Recovery.—A lady, whose age does not appear in my notes, was married, and had three children, and was under my care for endometritis, associated with a good deal of general congestion of the pelvic organs. She was progressing fairly well until one day, when she went to New York shopping; she walked and stood considerably, and on her way home in the afternoon, after crossing the ferry, decided to walk to her house, a distance of about three quarters of a mile; she did this because she was somewhat proud of her improvement under treatment. When about half through her short journey, she was seized with pain in the left side of the pelvis, which became so severe that she was obliged to sit down on the door-steps of a house near by, and, after resting for a short time, she managed to get home, went to bed, and applied a mustard-paste over the painful side; the next day or two she remained in bed, the pain gradually diminishing, though it did not wholly disappear. Four days afterward she rode to my office, and, on digital examination, I found a round, rather flat tumor in the left broad ligament, low down; it was somewhat solid to the touch, and tender. Being very desirous of knowing what this peculiar and suddenly developed tumor could be, I introduced a small aspirating-needle, and drew off a few drops of blood-serum and a few very minute shreds of blood-clot, but failed to find anything more, although I made a strong effort to do so. I then withdrew the needle, and found that it contained a long shred of blood-clot; this satisfied me that she had had a hæmorrhage into the cellular tissue of the broad ligament. I watched her with care and anxiety, but there was no inflammatory action established at that point, and the tumor slowly and completely disappeared.

Subperitoneal Pelvic Hæmatocele discharging into the Pertioneal Cavity, and ending fatally.—The following case is taken from the work of Thomas on "Diseases of Women": "In a case which I saw with Dr. Emmet, we were unable to make a diagnosis of a tumor which lay obliquely anterior to the uterus. In twenty-four hours the patient fell into a state of collapse, and, as we saw her thus, the nature of the tumor, which we were doubtful about on the previous day, became evident. Upon a post-mortem examination, an ante-uterine hæmatocele as large as a goose's egg was found under the peritonæum, through which it had broken, discharged a portion of its contents into the peritonæum, and caused collapse and death. This is the only ante-uterine, but not the only subperitoneal, hæmatocele with which I have met."

For an illustration of subperitoneal pelvic hæmatocele giving rise to cellulitis and suppuration, the reader is referred to a case given under the head of "Pelvic Cellulitis."

CHAPTER XXXV.

ECTOPIC GESTATION.

The subject of ectopic gestation is one of such importance as to have induced me to write a chapter upon it. Much, if not all, that has been done of late years to advance our knowledge of the matter has come from the gynæcologists, and the management of these cases has naturally fallen into the hands of those who are skilled in abdominal and pelvic surgery.

The term *ectopic gestation* is applied to the implantation and development of the impregnated ovum outside of the cavity of the uterus. In the past, authors have held that there was a great variety of these peculiar gestations, which were classified according to the location of the ovum. Tubal, ovarian, abdominal, and interstitial, were all said to occur frequently. Further investigation has led to the conclusion that tubal gestation is either the only primary form, or at least that any other origin than in the tube is rare. That ovarian pregnancy may exist, is shown by the cases of Bandl and Nouratoff.

In the interstitial form the ovum grows in that part of the tube occupying the wall of the uterus, and as the ovum enlarges the uterine wall splits and develops to accommodate it. I feel satisfied that many so-called cases of ectopic gestation are really gestation in one horn of an imperfectly developed uterus. The abdominal variety was supposed to arise from an impregnated ovum which had become fixed in the peritoneal cavity and developed there. Recent observations show that such cases are primarily tubal gestation, that rupture of the tube occurs, and that the ovum escapes and forms an attachment to the peritonæum.

A statement which would express the modern views is about as follows: All cases are at first tubal. Rupture of the tube takes place in all cases, as a rule, and the ovum escapes either into the peritoneal cavity, or in between the folds of the broad ligament. After escape of the ovum in one or the other direction, the ovum may live and develop into either the intraperitoneal or extraperitoneal variety. In the extraperitoneal variety a second rupture may take place, and thus it may become intraperitoneal, or the ovum may develop to maturity in the broad ligament.

Pathology.—There is at all times some abnormal condition of the sexual organs which renders extra-uterine gestation possible. This will be referred to when treating of causation.

The natural tendency in tubal gestation is for rupture to take place with escape of the ovum. Rupture occurs before the fourteenth week in ninety per cent of the cases. Previous to the complete rupture there are occasionally minor lacerations of the peritoneal covering of the tube. Especially is this likely to take place when there has been peritonitis which has impaired the nutrition and elasticity of this serous membrane. There are usually slight hæmorrhages either into the tube or into the peritoneal cavity, attended with pain in the earlier lacerations. When rupture occurs, death ensues in most cases, unless relief is afforded by operating. Death is caused by hæmorrhage and shock in the majority, but some survive this, and finally succumb to peritonitis or septicæmia from suppuration.

In case of rupture the ovum may plug the opening and arrest the hæmorrhage; the placenta may form attachment to the peritonæum, and the gestation go on to full term as an abdominal pregnancy. This is, perhaps, one way in which an abdominal pregnancy may occur, but it is rare.

Finally, the ovum may die in the tube and become encysted, or disappear by absorption.

Causation.—There is really very little known about the etiology of ectopic gestation. Several theories have been advanced with much positiveness, but there are few facts to sustain them. It is known that the ovule usually becomes impregnated in the Fallopian tube, but why it should attach itself to the mucous membrane of the tube and develop there is not clearly made out. Johnston states, in the Transactions of the American Gynæcological Society for 1890, that the mucous membrane of the tube and the peritonæum, when divested of their epithelium, are capable of forming a nidus in which an ovum may develop, and disease of the tube causes such exfoliation of the epithelium. The old theory is, that some narrowing of the tube which would obstruct the passage of the ovum to the uterus, at the same time that all other conditions were favorable, would lead to such result. In later times it is supposed that, owing to some disease of the endometrium, the impregnated ovum is retarded in its transit or entrance to the uterus, and, finding favorable conditions in the tube, remains to develop there. Another explanation of the retention of the ovum in the tube is, that there are oftentimes small diverticula in the lower side of the tube into which the ovum may fall and be retained. After all, it is evident that but little is known definitely on this subject that can be positively stated.

Symptomatology.—It is of the highest importance that a diagnosis should be made in ectopic gestation as early as an opportunity is afforded to do so. No matter what the treatment may be, the medical attendant has great advantages if he knows the nature of the case before being called upon to interfere by operative or other means. On this account the symptomatology has a special interest which I desire to direct attention to, especially so because in the past few years much has been said about the difficulty or impossibility of making a diagnosis. An experience neither more nor less than that which usually falls to the lot of one in twenty years' practice has led me to believe that the diagnosis of ectopic gestation is just as possible as of normal gestation. There are exceptional cases, I know quite well; but the rule is, that one can be as sure of the presence of an ectopic gestation as of any of the various forms of internal disease.

The Signs and Symptoms of Tubal Pregnancy.—These may be prefaced by the statement that a considerable period of sterility usually precedes the history of such a case. On examination we shall find many of the following conditions:

1. The signs of pregnancy are present. Menstruation ceases, or is replaced by the peculiar hæmorrhages mentioned below. Nausea and vomiting, salivation, and changed appetite are noted. We find some of the early mammary signs, such as increase in size and firmness of the gland, erectility of the nipple, glandular follicles, pigmentation, œdema and elevation of the primary areola, and enlarged veins. Pelvic discomfort is marked. Compared with normal pregnancy, the signs are often more pronounced. In most of the cases I have seen the patients have been irritable and apprehensive.

2. Hæmorrhages from the uterus occur usually in gushes of larger or smaller amount, and they are especially liable to appear at the time of the painful paroxysms. The hæmorrhages and the cast often suggest miscarriage.

3. A decidual cast is thrown off, and this cast has no fœtal villosities. It may be entire, or may be discharged piecemeal. Shreds must be looked for.

4. The patient suffers from paroxysms of pain which are "abrupt, violent, supervening on apparent health, cramp-like in character,

and usually referred to the seat of the fruit-sac, while the more acute paroxysms are attended with collapse and signs of internal hæmorrhage."

On bimanual examination the uterus is found (1) to be enlarged; (2) it is displaced according to the size and situation of the fruit-sac; (3) the cervix is open; and (4) the uterine cavity is empty. When metrorrhagia exists or the decidua has been expelled, there need be no hesitation in using the sound. The tumor which is detected beside the uterus or behind it is a cyst, (1) tense, (2) tender, (3) pulsating, and (4) rapidly growing. This tumor is extremely sensitive. There is evidence of extraordinary vascularity in the pulsating vessels which are easily felt, and this is a sign seldom found except in intraligamentous fibroma and occasionally in cancer. The rapidity of growth is striking as it is watched from week to week, and frequent examinations are therefore required. No other cyst likely to be confounded with it increases with the same rapidity. In the absence of adhesions, ballottement of the whole tumor is said to be feasible, but I believe it to be difficult. Contractions of the tube, in imitation of the uterus, have been detected as the time of rupture approached.

The tumor must be differentiated from hydrosalpinx or pyosalpinx, small ovarian cyst and pregnancy in one horn of a double uterus, but the only conditions that I have seen which are difficult to distinguish from tubal gestation are pregnancy in a uterus bicornis and hæmatocele. The presence of the other horn of the uterus, and the fact that the pregnant horn is continuous from the cervix upward, and the tumor denser than a distended tube, are sufficient. This I feel sure of, having made a differentiation in several cases. A small pelvic hæmatocele, if seen soon after the hæmorrhage, can not be distinguished from the tumor of ectopic gestation, except by the difference in history. The presence of the products of peritonitis which preceded the gestation, and also a uterine fibroma, as complications, may make a positive diagnosis impossible.

Symptoms developed when Rupture takes place.—When the rupture opens into the peritoneal cavity the symptoms are extremely grave. The pain is agonizing; the surface of the body becomes cold and is bathed in clammy perspiration; the pulse is feeble and rapid; the temperature becomes subnormal, and there is nausea, while distention of the bowels from flatus soon comes on. In short, there is shock, and it gradually becomes more profound as the hæmorrhage continues. If relief is not afforded the patient dies from shock. In case the bleeding ceases and the patient rallies, the symptoms of shock gradually give way to evidences of peritonitis; and if this does not prove fatal, septicæmia may supervene, or, more rarely, recovery may follow.

When the rupture opens into the broad ligament, pain and symptoms of depression are present, but the shock is not marked. The symptoms are like those of subperitoneal hæmatocele, and are not violent in all cases.

Physical Signs present when Rupture has taken place.—The signs at this stage are of value in determining the direction of the rupture. In the intraperitoneal variety, the sac of Douglas becoming filled with blood, the soft, fluctuating hæmatocele can be felt through the vagina. This, taken in connection with the violent symptoms, confirms the diagnosis, and enables the surgeon to operate with more certainty of avoiding the extraperitoneal variety. In the subperitoneal variety the tumor is lower in the pelvis and is solid to the touch from the first, and in this way can be made out with sufficient certainty to enable one to forego operation for the time being, which is the wise course to pursue.

Treatment.—The management of ectopic gestation involves many questions. The course to be pursued must depend upon the stage of the gestation and the character or form of each case in hand.

In cases which come under observation before rupture has taken place the life of the embryo should be arrested. This principle of treatment has for a long time been advised, and several methods of accomplishing this object have been advocated. Electricity, according to the latest reports, is the safest and surest of all forms of treatment, and, notwithstanding much opposition from certain quarters, I feel bound to advocate it.

Some prefer the interrupted, others the continuous, current. The way of applying it is to place a cotton-covered ball electrode in the vagina at the place nearest to the tumor, and a large flat sponge or clay electrode over the abdomen on the side where the tumor is. The strength of the current should be gradually raised until it is as strong as the patient can bear, and continued from five to eight minutes. This should be repeated daily until the life of the embryo ceases, which is shown by the tumor becoming smaller. To any one who has treated uterine fibromata with electricity this treatment of ectopic gestation is easy. The manipulations are about the same.

When the gestation is arrested in this way the ovum is disposed of by absorption. The tissues are soft, being very largely composed of water, and are as readily taken up as blood-clots. That the ovum may die from natural causes and be disposed of without detriment to the patient, is admitted, and the same results can and do follow when electricity is employed to secure the initial stage in the process.

Owing to the opposition which has been raised to this mode of treatment, it seems necessary that a word or two should be said in its favor, and also to notice the reasons given for the objections that have been made.

That this method is efficient, I believe upon the ground that many operators have tried it and found it successful. I also have seen cases so cured. The most powerful argument for it is that of Brothers, who collected fifty-three cases treated by electricity, as reported in the American Journal of Obstetrics for April, 1890. By the simple, safe, and certain method I recommend, all the fœtuses were killed and not one of the mothers was lost. It is gross unfairness to attribute the deaths in this table to electricity. The fatal result in the patients of Braxton-Hicks, Duncan, and Boulton was due to the other measures employed. In the first case it was due to the puncture of the cyst through the vagina five weeks later, which started an internal hæmorrhage. With Janvrin's patient internal hæmorrhage had begun, and the case was not a proper one for electricity. Tait lost two out of thirty-five patients treated by laparotomy, and Veit three in twenty. In the hands of less expert men abdominal section is still more dangerous. Electrical fœticide comes nearest to the spontaneous method of relief. If carefully and skillfully employed, it is safe; should it fail, or if any unfavorable results follow, such as suppuration in the tube, or rupture, the case can still be treated by abdominal section.

The objections have little weight. The first is, that we have no moral right to sacrifice the life of a fœtus under any circumstances. If this objection came from a certain class of theologians, it should be accepted as a guide in dealing with those who desire to accept that doctrine. Strange to say, it comes from those who urge and advocate abdominal section and removal of the ovum. The argument appears to be that it is wrong to arrest ectopic gestation with electricity, but right to do so by abdominal section. It has been said that the embryo may be destroyed by electricity, but the placenta will continue to live and grow and prove dangerous. The one or two reported instances are very doubtful. Brothers's collection contains no such case. At the time when electrical treatment is indicated the placenta is only partially developed, and it loses its vitality when the death of the fœtus occurs. That is the rule in normal gestation, and there is no proof that the natural law is reversed in tubal gestation. There is said to be danger of the dead ovum causing suppuration and septicæmia. That is true, but it seldom does so; and, as stated already, if a case goes wrong, abdominal section can be employed with as good results, or better than after rupture takes place.

Finally, the most unfair argument of all is, that those cases claimed to be cured by electricity are cases of mistaken diagnosis. This is not worthy of serious consideration.

Treatment after Primary Rupture of the Sac.—Abdominal section is the method of management which is called for in case rupture has taken place. When symptoms of rupture appear, the operation should be at once resorted to. If it is possible to determine that the rupture is into the broad ligament, operation is not called for; but in case there is doubt, the abdomen should be opened, and if there is no hæmorrhage into the peritoneal cavity the abdomen should be closed. When the peritonæum is reached, the presence of blood within it is shown by the dark color of the translucent membrane and by its bulging, and, if further evidence is required, by nicking the peritonæum and passing in a pipette toward the *cul-de-sac.* The operation is the same as in removal of the diseased tubes. Search for the tube should be made, and, when found, it should be withdrawn and its attachments ligated and the whole removed. This controls the bleeding, and then the peritoneal cavity can be cleansed of blood. The wound is closed in the usual way. This operation is indicated and is highly successful when the ovum has died and decomposition has followed.

Years ago I saw a patient who was not treated in any way until acute inflammatory symptoms had developed. She was then treated for peritonitis, and died of septicæmia. Post mortem, the gestation sac was easily separated from the peritoneal adhesion and removed. This experience enabled me to save the life of a similar patient by abdominal section.

I am more and more disposed to operate as soon as a presumptive diagnosis is made, unless the patient objects on ethical grounds.

When rupture takes place into the peritoneal cavity—that is, in intraperitoneal cases—operation should be resorted to immediately if the symptoms are urgent.

When the rupture extends downward the question of treatment is changed in all its important features. Those whose opinions are most rational advise delay in subperitoneal cases until the ovum either dies or continues to grow. Operation is indicated if after the death of the embryo there are inflammation and suppuration with evidence of coming septicæmia. The treatment, then, is to evacuate and drain the sac through the vagina, making the incision with the cautery, according to the method practiced by Dr. T. G. Thomas long ago.

There are some who advocate operating through the vagina while the ovum is still living and growing, but I am sure that this is very dangerous. There is always a strong possibility that the placenta may be at the most dependent part of the sac and in the line of incision, and hence hæmorrhage is caused that can not be controlled even when the cautery is used in making the incision.

In the subperitoneal cases that have progressed to or near the fourth month I prefer the treatment devised and carried out successfully by Dr. D. Berry Hart. He opens the abdominal wall on the side down to the peritonæum, and, raising up the peritonæum, opens the broad ligament and removes the contents of the sac excepting the placenta, which he leaves; he then packs the cavity and drains until the placenta dies and can be removed or washed out; afterward the sac is permitted to close.

Dr. Hart has had five successful cases of this kind, and that gives great confidence in the treatment of this subperitoneal variety of ectopic gestation. The operation can be done when the embryo is still living, and with far greater safety than by either abdominal section in the median line or vaginal section.

Operation after Rupture of the Sac.—When secondary rupture occurs, with dangerous hæmorrhage, laparotomy is indicated, just as it is in primary rupture.

In this condition the time to operate and the method of procedure are determined for the surgeon, to a great extent at least. The secondary rupture is indicated by the local and constitutional symptoms, which in some cases are comparatively mild, while in others they are marked and call for interference.

On opening the abdomen, the fœtus, which has escaped into the abdominal cavity, is removed, and the cavity cleared of blood. The rent in the sac is sought for and all hæmorrhage arrested. If the rent is in front, the walls of the sac are fastened to the parietal wound with sutures and the sac drained. When it happens that the rupture is so situated that it can not be brought to the wound in the abdominal wall, it should be closed, and another opening, large enough to admit a drainage-tube and the cord, made in front. The further treatment should be as if the original rupture had occurred in front. Drainage of the abdominal cavity should also be employed.

Operation when the Fœtus is Dead.—In this condition it should be understood that while the fœtus has died the sac is not ruptured, and that the decomposition of the fœtus causes danger from septic infection, and the danger therefrom demands operative interference.

The complications which may occur in this state are very variable. The length of time that is permitted to elapse, and the extent of inflammatory products or changes that may take place, give characteristics that render no two cases alike. Some cases are as simple to operate on as an ordinary abdominal abscess; in others, intestinal and other adhesions are found that make the operation the most difficult. The method of procedure must depend upon the nature of the case, and the judgment and dexterity of the surgeon must be the only guides.

The whole gestation sac may be removed as easily and in the same way that an ovarian cyst is removed, the conditions being favorable. When the adhesions are such that it can not be safely removed, as determined by a careful exploration, then the sac should be aspirated and its walls fixed to the abdominal wall and drained. Drainage of the abdominal cavity as well as of the sac may be necessary. As a rule, the placenta should be removed.

Operation at or before Full Term when the Child is Alive.—It is no easy matter to decide whether to operate at once and save the child—primary laparotomy—or to wait until spurious labor has come on, the child has died, and sepsis threatens—secondary laparotomy. If we wait until the child has been dead two or three months, the placental vessels atrophy, and the danger of hæmorrhage from the placental site after the operation is vastly diminished. Harris gives thirty per cent as the death-rate in secondary laparotomy. Heretofore the maternal mortality has been so great after primary laparotomy (ninety-six per cent previous to 1880) that it was not justifiable, but since the death-rate dropped to sixty per cent between 1880 and 1888 (Harris), and as it has dwindled to twenty-eight per cent since 1888 (Pozzi), the operation demands consideration. The sac is stitched to the abdominal wound and then incised. The child is removed and the cord tied. Then the placental site may be controlled by a hæmostatic suture, and the placenta, together with a large part of the sac, may be removed. If this procedure is not feasible, the placenta may be left to come away later, and the cavity carefully drained.

The after-treatment consists in pumping out the fluid that accumulates in the sac and does not escape through the tube. If the drainage is not perfect in this wise, the cavity should be washed out through the tube. This is generally necessary in order to remove the *débris* of the placenta as disintegration goes on. Portions of the placenta are liable to slough, and it is then necessary to enlarge the wound to permit such masses to escape.

There are certain complications which may occur. Several of the most common I here refer to and discuss their management. If there is much fluid in the sac, it should be removed by tapping. Intestinal adhesions in front should be separated in the usual way, if that is possible. If not, the portion of the sac which is adherent should be divided around the point of contact, and allowed to remain attached to the intestine, using the opening thus made to extract the child.

When the attachment of the placenta is in front and in the line of incision, its presence there is indicated by the extraordinary vascularity and dark color of the sac-wall. This may possibly enable the surgeon to avoid making the opening at that point of the sac. If the placenta can not be avoided, the incision should be quickly made and the bleeding arrested with forceps, until sutures can be introduced through placenta and sac-wall to control the bleeding. Every effort should be made to avoid the placenta, as it complicates the operation greatly.

In the subperitoneal variety the sac consists of the peritonæum and broad-ligament tissue, and differs in vascularity, thickness, and character from the intraperitoneal variety. The sac looks like an intraligamentous ovarian cystoma or uterine myoma. In this condition of things there is much hæmorrhage where the sac is opened, and the same manipulations are called for that were described in speaking of opening the sac at the point of placental attachment.

We may broadly summarize as follows: The intraperitoneal form (of ectopic gestation) should be operated on when rupture takes place. The subperitoneal variety should be let alone after rupture unless suppuration occurs, and should then be operated on through the vagina.

DISEASES OF THE URINARY ORGANS.

CHAPTER XXXVI.

ANATOMY AND DEVELOPMENT OF THE BLADDER AND URETHRA.

This portion of the present work is undertaken with the full assurance that the medical profession is in need of a systematic and practical treatise on the diseases which affect the urinary organs of the female sex, and that such a treatise should be included in every work on gynecology which lays claim to being complete. Those engaged in active practice often encounter cases of cystic disease among their female patients, many of which are exceedingly troublesome if not altogether impossible to manage. There is, moreover, but little in English literature, at least, to aid them when thus perplexed with the difficulties of diagnosis and treatment.

In considering this important subject after the plan which I have adopted, much will be purposely omitted, which, though interesting, is not absolutely necessary to a clear understanding of its essential principles. The conflicting views of various authors regarding unsettled questions will, when possible, be entirely disregarded in order to make room for the more practical points which the physician is expected to carry with him in his daily practice. In short, it will be my purpose to supply, so far as I may be able, the deficiency in this branch of medical literature, the existence of which a busy life in private practice and in teaching medical students and post-graduates has demonstrated.

To proceed systematically, I will first take up the form and structure of the bladder and urethra, and the relations which they bear to other organs and tissues in the female, and then pass on to the consideration of their development.

Anatomy of the Bladder.—The bladder is a musculo-membranous sac, situated in the anterior part of the true pelvis. Its form varies with the age of the individual and the degree to which it is distended. In childhood, the vertical diameter is the longest; in middle life, the transverse; in old age, from the sagging of the inferior fundus and gradual atrophy of the pelvic organs, the vertical again becomes the longest diameter. When empty, its walls are closely coaptated, and it lies behind the pubes. Between the pubes and the bladder is a space containing loose fat. When moderately filled, it rises slightly above the pubes, and assumes a somewhat ovoid shape, which is much more marked during distention. In the female the bladder has a shorter antero-posterior and a greater lateral diameter than in the male.

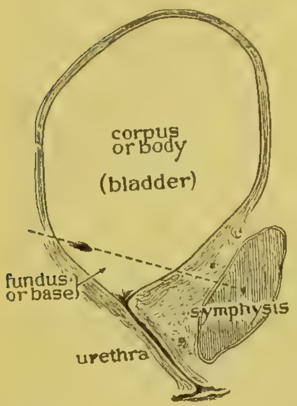

FIG. 238.—Diagram of the bladder to show corpus and fundus.

The bladder in the female is, for accuracy and convenience of description, divided into corpus (body), fundus (base), and cervix (neck) (see Fig. 238).

The corpus is all that portion of the organ lying above an imaginary plane, passing through the vesical openings of the ureters and the center of the symphysis pubis. That part lying below this plane is the fundus or base, and is variously divided. The portion which lies between the vesical openings of the ureters behind, and the vesical orifice of the urethra in front (Fig. 239), is known as the trigone, or vesical triangle. That portion of the base lying just behind the ureteric openings is known as the bas fond. This is usually but a slight depression in early and middle life, but in disease and advanced age it often becomes a deep pouch or sac. This is more often the case in the male than in the female. The cervix or neck of the bladder is that funnel-shaped space at the apex of the trigone, where the bladder and urethra merge into each other.

The bladder has three coats—two complete and one partial or incomplete. From without inward these are the serous (incomplete), the muscular, and the mucous. The serous investment of the bladder, like that of all the abdominal and pelvic organs, consists of peritonæum, of which I will speak more fully when I come to consider the ligaments and topographical relations of this organ.

The middle or muscular coat has a peculiarly efficient fiber arrangement. Its layers have been divided into two—external and internal—but so frequent and so intimate are their interlacements that, though when minutely considered they are two, practically they act and appear as one. The main direction of the outer fibers is longitudinal; of the inner, circular. There is also a thin stratum of muscular fiber lying just under the mucous membrane, and continuous with the longitudinal fibers of the urethra. The main fibers are of the unstriped or involuntary kind, and take their origin chiefly from the neck of the bladder.

According to some authors, the sphincter vesicæ is formed by a strong band of muscular fibers, varying from one eighth to half an inch in thickness. By others, and these are perhaps the best authorities, it is claimed that there is no true anatomical sphincter of the bladder. The function of the sphincter vesicæ is said to be performed by the closing together of the longitudinal folds of the tissues at the junction of the bladder and urethra, or by the transverse semicircular folds that close over each other.

At the base of the bladder two little muscular slips arise from the portion usually designated as the sphincter vesicæ, and find insertion about the vesical openings of the ureters. These muscular fasciculi are but imperfectly developed in the female, and probably have little if any specific action.

The lining or mucous coat of the bladder is like that of the ureters and urethra. It consists of a basement membrane, supporting two or more layers of epithelium, in some parts squamous, in others cylindrical, the whole lying upon an elastic, cellulo-vascular bed that is fitted into the meshes of the reticulated muscular coat beneath.

This mucous membrane is nowhere attached closely to the subjacent muscular layer, save at the trigone, the neck, and about the orifices of the ureters. Owing to the general looseness of attachment when the bladder is partially or wholly contracted, the mucous membrane is thrown into rough, uneven folds everywhere, save at the points of close attachment already mentioned.

In the trigonal space the membrane is thinner, more closely adherent, and the surface epithelium is usually of the medium-sized, squamous variety. The nerve-supply to this small space is very rich, and, in consequence, it is the most sensitive part of the bladder.

Although Savage denies the presence of glands or papillæ in the mucous membrane of the bladder, Holden and many others maintain (and correctly, I think) that the membrane is studded with numerous little glands and follicles, whose function is to supply mucus to the internal surface of the organ. They are most numerous at and about the vesical neck.

The trigone in the female is a smaller space, and has less distinctly marked boundaries than in the male. That little elevation of mucous membrane lying at the very apex of the trigonal space, and known as the uvula, is also but little developed in the female.

Running between the vesical orifices of the ureters, Jurie claims to have found what he calls the *inter-ureteric ligament*, in the ends of which he asserts that the ureteric orifices are imbedded. To its action he attributes the power that the bladder has of preventing regurgitation into the ureters. I will speak more fully on this point presently.

Normally, the bladder has three openings, one for each ureter, and the urethral orifice. The openings of the ureters lie on each side of the median line at the base of the bladder, about one inch and a half behind the vesical opening of the urethra, and about two inches apart. The ureters pierce the bladder-wall obliquely, and their openings are so minute as to be hardly visible to the naked eye. Their points of entrance are marked by a slight puckering in the mucous membrane. The third opening is the ostium urethræ internum, which is a diagonal slit at the juncture of the vesical neck and urethra.

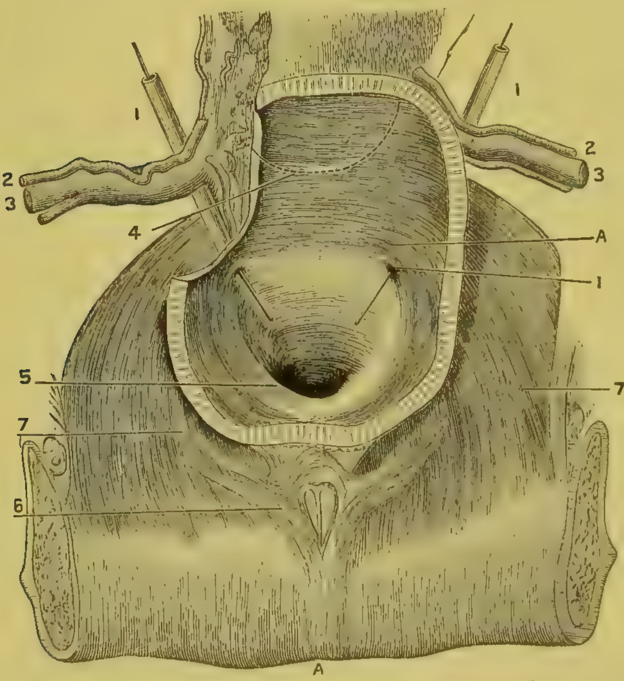

Fig. 239.—Base and neck of the bladder (Savage). A, symphysis pubis. 1, 1, Ureters. 1′, Ureteric openings. 2, 3, Uterine artery and veins. 4, Outline of cervix uteri. 5, Vesical neck. 6, Arcus tendineus and vesico-pubic muscles. 7, 7, Pubo-coccygeus muscles.

According to Rutenberg, the color of the vesical mucous membrane in the living subject before dilatation is a dull, grayish red; but, as dilatation proceeds, and the irregular folds are straightened out, it becomes gradually a brighter red, and, when complete distention is accomplished, the minute arteries can be seen forming a beautiful interlacing network on the bands of the muscular reticulæ. Whenever it has been my good fortune to see this membrane in the living subject, it has appeared to me as being of a grayish-pink color, not unlike that of the mucous membrane of the cervix uteri when anæmic.

The vascular supply of the bladder is very free, being derived from the superior, middle, and inferior vesical arteries, and branches from the uterine artery. They all arise from the anterior trunks of the internal iliac arteries. The anastomoses of the arterial twigs are numerous and free. The veins are also numerous and large, forming by interlacement and connection thick, tortuous plexuses about the base, sides, and neck of the bladder, and finally terminate in the internal iliac veins. This plexus about the neck of the bladder communicates freely with that of the labia minora, uterus, and rectum. These venous plexuses are the chief elements in the so-called "hæmorrhoids of the bladder."

In their tortuous course these veins are accompanied by lymphatics that seem to have their origin in the submucous cellular tissue of the bladder. They enter the glands situated about the internal iliac artery, and from there go to the lumbar glands.

The nerves of the bladder are of two kinds—spinal and sympathetic. The spinal nerves are branches, usually from the fourth, sometimes from the third, and rarely from the second sacral nerve. They terminate chiefly in and about the neck and base of the bladder. The sympathetic nerves have their origin from the hypogastric plexus, which lies in front of and on the last lumbar and first sacral vertebræ. It is formed by a mazy interlacement of numerous ganglionic fibers, and branches from the spinal nerves, especially the second sacral. Ganglia are common, more particularly at the point of junction of the spinal and sympathetic nerves. This plexus sends branches to all parts of the bladder, and to the vagina, uterus, and rectum. This common nerve-supply to the various pelvic organs must be borne distinctly in mind in order that the functional derangements and neuroses of the bladder, hereafter to be described, may be thoroughly understood.

Anatomy of the Urethra.—The female urethra is a musculo-membranous canal, from one to two inches in length, the average being about one inch and three eighths. Its diameter is greater than that of the male, being about one fourth of an inch.

It lies in the median line, just under the pubic arch, and is held in position by the median pubo-vesical ligament. In the erect position it has a direction upward and backward, and at all times, when normal, its axis closely corresponds to that of the pelvic outlet. It terminates anteriorly at the base of the vestibule by an opening known as the meatus urinarius, and posteriorly at the neck of the bladder.

It has a cellular, a double muscular, and a mucous coat. According to Robin and Cadiat, its mucous membrane is richer in elastic tissue than any other in the body. The epithelial covering of the anterior or lowest portion is of the pavement variety, and closely resembles that of the vagina, except that it is not so large. Figs. 242 and 243 show the difference between the two. Posteriorly and superiorly it is like that of the bladder — columnar and squamous. Scattered throughout are little papillæ, containing blood-vessels, and near the meatus there are numerous lacunæ surrounded by villous tufts. There are also a number of small mucous glands, that in old people often contain black particles, like the prostatic concretions of the male.

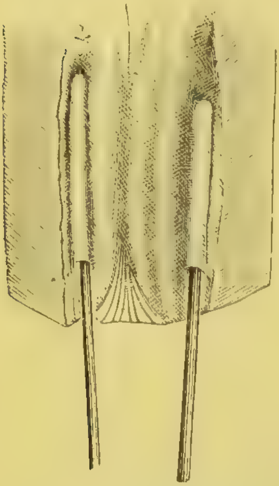

FIG. 240. — Urethra laid open with probes distending the glands (posterior wall divided).

Upon each side, near the floor of the female urethra, there are two tubules large enough to admit a No. 1 probe of the French scale. They extend from the meatus urinarius upward, from three eighths to three quarters of an inch. Fig. 240 is a drawing from a section of the urethra, laid open by division of its posterior or vaginal wall. The tubules, having been distended by probes passed into them, are plainly seen.

Fig. 241 shows the same thing from the opposite side, the urethra having been laid open by section of its anterior wall. The space between the tubules is the floor of the urethra. From these it will be observed that the tubules run parallel with the long axis of the urethra.

They are located beneath the mucous membrane in the muscular walls of the urethra. This is represented by Fig. 242, which is a drawing taken from a transverse section of the urethra, about a quarter of an inch from the meatus.

The mouths of these tubules are found upon the free surface of the mucous membrane of the urethra, within the labia of the meatus urinarius. The location of the openings is subject to slight variation, according to the condition and form

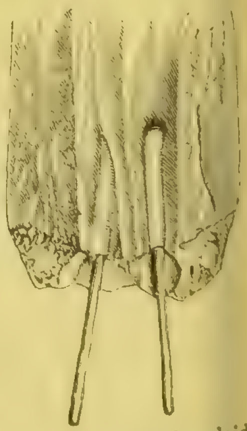

FIG. 241.—Urethra laid open with probes in Skene's glands (anterior wall divided).

of the meatus. In some subjects, especially the young and very aged, and in those in whom the meatus is small, and does not project above the plane of the vestibule, the orifices are found about an eighth of an inch within the outer border of the meatus. When the mucous membrane of the urethra is thickened and relaxed, so as to become slightly prolapsed, or when the meatus is everted, conditions not uncommon in those who have borne children, the openings are exposed to view upon each side of the entrance to the urethra. What is here described is represented in Fig. 244. The labia of the meatus have been slightly everted to bring the orifices into view.

The upper ends of the tubules terminate in a number of divisions, which branch off into the muscular walls of the urethra. By injecting one of the tubules with mercury, and then dividing it, the openings of the branches can be easily seen.

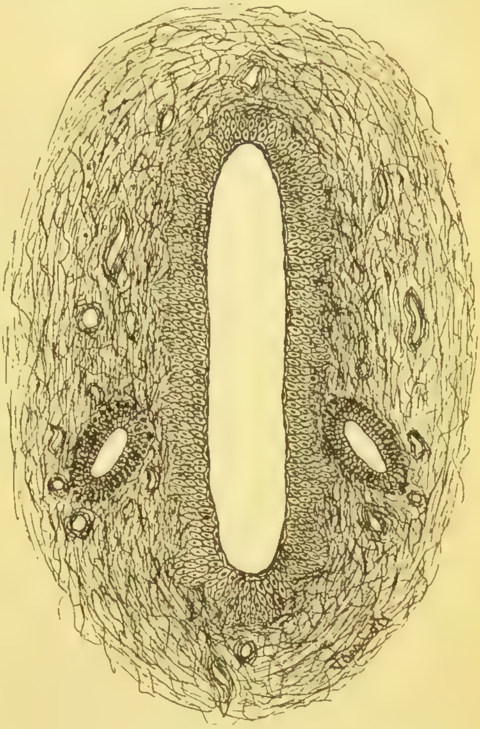
Fig. 242.—Transverse section of urethra with gland on either side.

This description of the anatomy of these glands is taken from dissections and microscopical examinations made by Drs. B. F. Westbrook and J. M. Van Cott, Jr. I have called them glands because they differ in size and structure from the simple follicles found in abundance in the mucous membrane.

When I first discovered these glands I presumed that they were mucous follicles that were accidentally of unusual size in the subject examined, but, having investigated more than one hundred of them in as many different subjects, and finding them constantly present, and so uniform in size and location, I became satisfied that they were worthy of a separate place in descriptive anatomy. The dissections made by Dr. Westbrook, and the pathological lesions to which these structures are subject, confirm this belief.

So far as I know, the anatomy of these glands has not been described, nor have the diseases to which they are subject been referred to by pathologists. At least this much may be said, that the standard text-books on anatomy and gynecology in English, German, and French contain no reference to them.

It is easy to understand why these insignificant glands should have been overlooked by anatomists, or, if noticed at all, classed with other mucous follicles. It is only when their pathology is understood that their real importance becomes apparent.

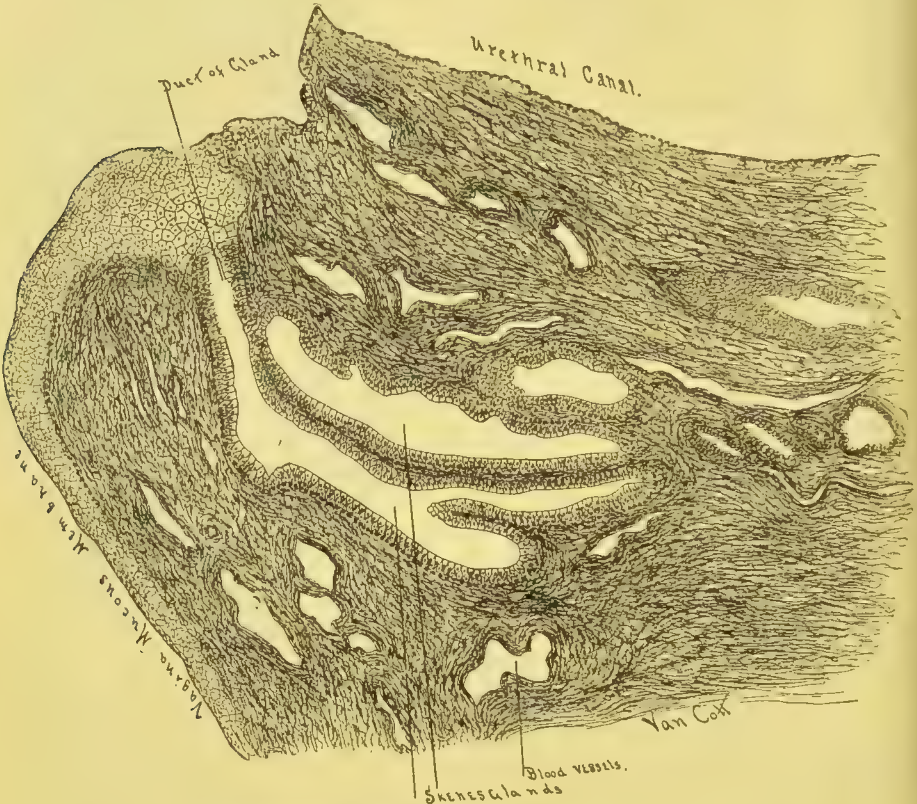

FIG. 243.—Longitudinal section of urethral glands.

I know nothing about their physiology. They serve some purpose in the economy, no doubt, but what is their function is a question to be answered in the future. This will doubtless be attended to at an early date, as the subject is worthy of investigation. The pathology of these glands, so far as has been investigated up to this time, is of great practical interest, and there remains, no doubt, much still to be studied. Clinical observation has already shown that they are subject to inflammation of various degrees of intensity and duration.

The meatus urinarius in the female differs from that of the male in being a puckered and somewhat prominent, rather than a slit-like and depressed opening. The mucous membrane of the urethra is thrown into longitudinal folds throughout, save when opened and unwrinkled during micturition or by artificial dilatation. When at rest it is a closed canal.

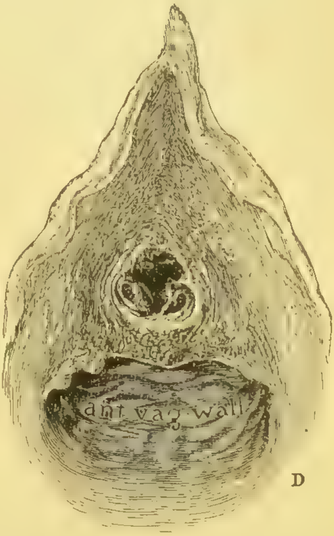

FIG. 244.—The meatus everted, showing the mouths of the glands. (From a preparation preserved in alcohol.)

Beneath the mucous membrane there is a thick fibro-elastic network into which the mucous glands dip. These are lined with cylindrical epithelium and surrounded by a network of veins. This submucous areolar tissue has direct vascular connection with the muscular layer that surrounds it by means of cavernous venous sinuses, partly in the muscle and partly in the elastic connective tissue. Thus there is an arrangement almost exactly like that of the corpus cavernosum penis in the male. The venous plexus of the urethra is situated chiefly at the sides, in what is known as the urethro-pubic space.

The muscular layer is double, the outer portion being composed of both circular and spiral fibers mixed, and the inner of longitudinal fibers only, and these two layers are so closely bound together by the cavernous venous sinuses as to be in reality but one. Dr. Uffleman claims to have found an additional external layer, the fibers of which are voluntary. He divides this layer into two—an external and an internal—the former longitudinal, the latter transverse. These make what he calls the outer or voluntary sphincter of the bladder. From the vesical neck to a point about half-way down it wholly invests the urethra, forming only a partial investment from that point to the meatus.

Luschka claims to have found a sphincter of the urethra and vagina. He describes it as being smooth and circular, from one sixth to one third of an inch broad, lying directly behind the vestibule, and girdling both the vagina and urethra. Its function, he says, is to close the urethra by pressing it against the urethro-vaginal septum. Being closely adjacent to the cavernous venous tissue of the urethra, it locks its fibers posteriorly with those of the musculus transversus profundus.

In the female as in the male, the urethra pierces the triangular subpubic ligament, two layers of which extend around it; one backward and the other forward.

There is great diversity of opinion as to the nature of the vesical opening of the urethra in the female. According to Winckel and Simon it is a diagonal slit, the mucous membrane of which is longitudinally and superficially corrugated. According to Savage, it is a triangular opening; and according to Holden and others, a funnel-shaped opening. It of course varies somewhat with age, size of urethra, vesical contraction, or quiescence, and in the living and dead subject; and hence the diverse opinions of the various observers.

Anatomical Relations of the Bladder and Urethra.—Having discussed the anatomy of the bladder and urethra, it remains to examine the topographical relations of these organs. This is very necessary to a proper understanding of the influence of other organs in causing diseases and displacements of the bladder and urethra.

The bladder of the female lies lower in the pelvis than that of the male, between the pubes anteriorly, the uterus posteriorly, the vagina and uterine cervix inferiorly, and the small intestines superiorly. The organ when empty lies behind the symphysis pubis, its highest point slightly overtopping it. In this position it occupies but little space. When partially or wholly filled it rises above the pubes to a varying extent. In doing this it alters but slightly the position of the other pelvic viscera, although relatively its position is somewhat changed.

Anteriorly the bladder is separated from the posterior face of the pubic symphysis by intervening cellular tissue. Inferiorly it forms a close attachment to the anterior vaginal wall by means of a dense cellular cushion which increases in thickness from before backward. The bladder rests upon this vesico-vaginal septum as far up as the point where the body and neck of the uterus join each other. Posteriorly and somewhat superiorly to the bladder lies the uterus, and superiorly and postero-laterally are the ovaries and broad ligaments.

The close attachment of the vesical neck to the arch of the pubes, by the pubic ligament anteriorly and the vagina inferiorly, makes a kind of wedge that gives but little surface for bagging downward if the vagina holds its proper position. Though imperfectly, still to a certain extent, this arrangement resembles the perinæum in the male. Superiorly, the organ is held in position by a number of ligaments; five false and five true. The false ligaments (one superior, two lateral, and two posterior), are formed of peritonæum. This membrane is reflected from the inner face of the anterior abdominal wall to the bladder investing it superiorly, laterally, and, to a certain extent, posteriorly. It joins the organ in front, dipping down just above the pubic summit to the superior vesical surface, and passes as far backward as the point of contact between the vesical base and uterus, which is at the junction of the uterine body and cervix. Although this peritoneal covering of the bladder is firmly adherent, it never leaves its uterine or other attachments, however much the bladder may be distended and rise above the brim of the pelvis.

That portion of the bladder lying behind the pubes, that resting on the vagina and uterine neck, and a small posterior and lateral portion have no serous investment.

The true ligaments are also five in number—two anterior or vesico-pubic, two lateral, and the superior or urachus cord.

Laterally, the round ligaments of the uterus pass over the bladder-wall, and just below and posteriorly the ureters enter that organ.

These ducts, the excretory ducts of the kidneys, are usually described as passing downward, forward, and inward, after entering the cavity of the pelvis, to the base of the bladder, and after passing for an inch between the muscular coats of that organ opening into it by constricted orifices. In their course they pass along the sides of the cervix uteri and upper part of the vagina, and at their points of entrance into the bladder are from one half to three quarters of an inch in front of the cervix uteri. It is very important that the relation of the ureters to the bladder should be borne in mind, especially in the operation of gastro-elytrotomy. Garrigues, who has investigated this point, says: "The ureter does not lie in the broad ligaments, it does not keep the same direction on reaching the wall of the bladder, and it does *not* lie close up to the wall of the cervix, as taught by anatomical authorities. After having crossed the iliac vessels the ureters diverge, running downward, backward, and a little outward on the wall of the pelvis, behind the broad ligaments to a point near the spina ischii. Then they lead downward, forward, and considerably inward so as to converge toward the bladder. They pass beneath the base of the broad ligament, lying in the abundant cellular tissue found in this locality. They cross the cervix at some distance from behind, at an acute angle, so as to come in front of and below it. They lie outside and above the anterior part of the side wall of the vagina on a spot as large as the tip of the finger. On reaching the wall of the bladder they turn rather sharply inward and go downward until they open with a small slit into the interior of the bladder at the outer angle of the trigonum vesicæ. But on dissecting the bladder from the uterus and vagina their substance is seen to continue as a solid ridge between the two apertures, and forming the base of the trigone (Jurie's inter-ureteric ligament.)"

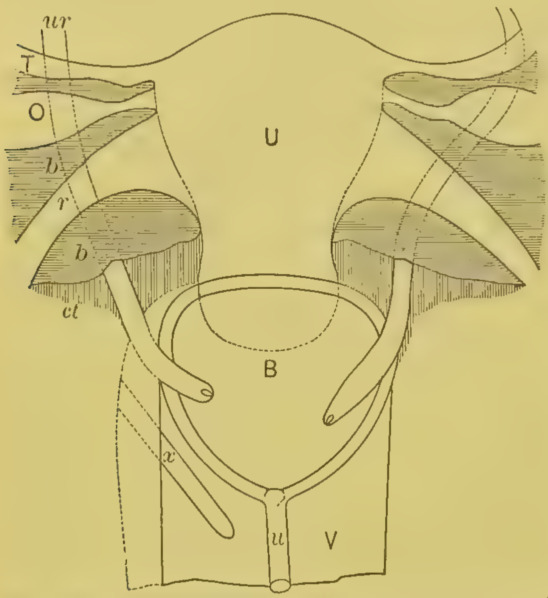

FIG. 245.—The relations of the ureters (Garrigues). U, uterus; B, bladder; *ur*, ureter; *u*, urethra; V, vagina; F, Fallopian tube; O, ovary; *b*, broad ligament; *r*, round ligament.

The illustration of Garrigues makes this description very clear (Fig. 245.)

Just in front of the small lateral space lacking serous investment the obliterated umbilical arteries pass upward and forward to the summit of the bladder reflecting the peritonæum, and thus forming a double pouch on either side.

The relations of the urethra are as follows: it lies just under the pubic symphysis, and, piercing the deep perineal fascia, extends from the vesical neck, at the ostium urethræ internum, to the meatus urinarius or ostium urethræ externum, situate at the base of the triangular space known as the vestibule. Its anterior three fourths are imbedded in the vaginal wall. The meatus urinarius lies about four fifths of an inch below the clitoris, in the vaginal margin of the vestibule. The vesical end of the urethra is about the same distance below the lower surface of the pubic symphysis. Its course is upward and backward forming a very slight curve.

Development of the Bladder and Urethra.—With this brief sketch of the structure of the bladder and urethra their development may be next considered. It would be very interesting, from a scientific point of view, to examine the process by which the bladder and urethra are formed in the embryo; but it would, I think, be rather tedious to take up the subject in all its minutiæ. A few of the more important points in the process of development must be understood, however, in order to comprehend the malformations which are occasionally met with. Most, or at least many, of the malformations of the urinary apparatus, like those of other organs are due to arrest of development at various stages of that process. A clear conception of the normal, therefore, will aid in better understanding the abnormal.

The urinary organs are developed in separate portions or sections having distinct points of origin, and by the union and fusion of these parts the entire apparatus is completed.

The bladder is formed from a portion of the allantois. When the abdominal plates of the embryo close around that portion of the allantois that forms the umbilical cord, they also shut in a portion which forms the urinary bladder. There remains, for a time, a direct communication between that portion of the allantois from which the bladder is formed and that which makes the cord, which takes the name of the urachus. The canal or duct in the urachus is usually obliterated before or soon after birth, so that all that remains of it is an impervious cord known as the superior vesical ligament. It will thus be seen that the bladder is developed from the allantois, which may be called one center of development for the urinary apparatus.

The centers of development for the ureters are the same as those for the kidneys. Indeed, the ureters are processes that are developed from the kidneys, and extend downward until they unite with the bladder, and finally open into it.

While the bladder and ureters are being thus formed, the lower portion of the alimentary canal—that which forms the rectum—becomes separated from the section of the allantois that forms the bladder. Into this space, between the rectum and bladder, Müller's ducts descend, and, uniting, form the vagina (see Figs. 53–57).

Posterior to Müller's ducts and anterior to the rectum, a mass of tissue is developed which helps to form the recto-vaginal wall above and the perinæum below.

Anteriorly Müller's ducts unite with the lower portion of the bladder, and aid in the formation of the urethra, or, at least, the upper portion of its posterior wall.

The lower or external portions of the genito-urinary organs are formed from an ovoid eminence which appears in the median line of the lower anterior part of the trunk of the embryo. At the lower part of this eminence there appears a fissure, which, incurvating and uniting with the lower portion of Müller's ducts (vagina) forms the terminal portion of the urethra and the introitus vaginæ. From this same center of development the labia majora, the labia minora, and the vestibule are formed.

CHAPTER XXXVII.

MALFORMATIONS OF THE BLADDER AND URETHRA.

Malformations of the Urethra.—Malformations, as has already been said, are usually the result of arrested development. Various failures in the processes necessary to form the complete urethra result in a number of malformations. The most important of these may be classified as follows:

1. Defectus urethræ totalis.
2. Defectus urethræ externus.
3. Defectus urethræ internus.
4. Atresia urethræ.

In the first form (defectus urethræ totalis) there is, as the term implies, entire absence of the urethra. It is said to be due chiefly to an arrest in the development of the vagina at a point where it should form the main portion of the posterior wall of the urethra. It is very probable that there is also an arrest of development of the clitoral process.

Coexisting with this malformation other developmental defects are generally but not invariably found, for it has been known to exist with an otherwise perfect genito-urinary apparatus. Petit tells of the case of a child, four years old, who had neither urethra, clitoris, nor nymphæ, but had a comparatively wide vagina. Langenbeck mentions the case of a girl, nineteen years of age, in whom the bladder and vagina formed a common canal. She was incontinent up to the age mentioned, and is reported to have gained control of the bladder afterward.

The second deformity (defectus urethræ externus) is due to the absence of the lower and anterior portion of the urethra. It has been called "hypospadias in the female." One of the most marked cases has been recorded by Von Mosengeil. The subject was a girl eight years old. The opening in the urethra was situated below a large clitoris, having a very full prepuce. It was much higher than the normal situation of the meatus urinarius. There was a groove running from the lower border of the vestibule up to the opening of the urethra, and it appeared to be formed from the anterior wall of the urethra. The upper portion of the urethra held its normal relations to the bladder and vagina, but was only half an inch in length. The bladder, in comparison with the other organs, was larger, and had a number of sacculæ. It will be observed that in this case the upper portion of the urethra was complete, and that there were present in the lower portion of the canal an anterior and two rudimentary lateral walls, the posterior wall alone being absent.

There is another form of defectus urethræ externus or hypospadias, in which the lower part of the canal is entirely wanting. In such cases there is but one opening between the clitoris and perinæum, and but one canal, this dividing into vagina and urethra at some distance from the outer opening. An interesting example of this was observed by Willigk, in a woman, who died at the age of forty-six. The uro-genital canal, at its opening, was about the size of a catheter, and ran in a curved direction under the pubes. About an inch and a half from its outer opening it divided into two passages, one anteriorly, 1″ long—the urethra, and one posteriorly, 2″ to 10″ long—the vagina.

The third deformity (defectus urethræ internus) is that in which the internal or upper portion of the urethra is wanting, and is a comparatively rare affection. The only cases, so far as I know, are given by Oberteufer and Duparcque. In Oberteufer's case, as I understand it, the lady was forty-two years of age, and all her life had passed water from the umbilicus. Her vagina was normal, and so were the external genital organs. The upper or internal portion of the urethra alone was wanting. Duparcque's case was one in which the urethra was pervious as far as the bladder, but was there closed. This case, however, appears to me more properly to come under the head of atresia urethræ.

The fourth class (atresia urethræ) is a comparatively common affection. There are two forms of congenital atresia mentioned by uthors. The first is produced by imperfect development of the vaginal process, or of both the clitoral and vaginal segments. Duparcque's case was of this kind, the urethra being open up to the bladder and there closed. It was a form of defectus urethræ internus with atresia at the upper end of the canal. In this case the bladder and ureters were greatly distended.

The other form of atresia is found when the clitoral and vagial processes are both defective. In such cases there is no trace of a urethra, except an imperfect vaginal wall which extends obliquely downward and closes the bladder. E. Rose relates a case of this kind in which the bladder, kidneys, and abdomen were filled with water. The urethral malformation was not the only one in this case, the vagina and uterus suffered from an arrest of development and were both double or rudimentary.

Before leaving this interesting subject I will mention another rare malformation. It is an obstructive anomaly, and consists in a double condition of the urethra. The only case, so far as I know, which has been described with any accuracy, is that of Furst. He observed in a preparation taken from the body of a young virgin the following peculiarities: In looking at the anterior bladder-wall at the first glance only one urethral orifice was to be seen, but one tenth of an inch forward toward the meatus the single urethra was seen to bifurcate; a fine septum, nearly straight, divided it from right to left into an anterior and posterior half; these continued with an ever enlarging and diverging septum until they opened into the vagina about one tenth of an inch apart. In this way they twisted, so that the anterior or superior one opened toward the right, while the posterior (the one in the region of the bladder) opened into the vagina on the left. The left urethra opened with a caliber of one fifth of an inch into the median line of the vagina. The right opened on the right of the median line, having a caliber of only one tenth of an inch. The length of the whole urethra was one inch.

It is of very rare occurrence that the double condition of the allantois persists in this manner, and, considering all the changes that the sinus uro-genitalis has to undergo, it seems strange that blending did not take place. It is also interesting from the fact that the allantoic openings into the cloaca can only take place by a very rapid and early interruption of development. The uterus and vagina, in this case, were perfectly normal.

Symptomatology of Malformation of the Urethra.—The symptoms that arise from malformation of the urethra are incontinence in the one class of cases, and retention of urine in the other. When the urethra is deficient in part and the bladder perforate, urine constantly escapes; and from the wetting, the excoriation, and the odor, the unfortunate subject is kept in continual misery.

In cases where there is an abnormal contraction of the vagina the urine can be retained, partially at least. This is supposed to be effected by the small size of the genito-urinary sinus, and, possibly, a voluntary contraction of the sphincter vaginæ muscle which may act as a sort of sphincter and aid in the retention of urine.

Atresia of the urethra and the consequent retention of the urine cause hydrops of the bladder, ureters, and kidneys, and also ascites, as has already been mentioned. Distention of these organs occurs *in utero*, and such malformed children are usually born dead, or die soon after birth. So great is this distention of the bladder and abdomen in some cases that delivery is difficult or impossible until the fluid is evacuated by puncture. I remember seeing one such case. The head was delivered, but there was great difficulty in delivering the body. The abdomen was enormously enlarged by the overdistention of the urinary organs. The child was very feeble, and after moaning for a few hours, died. No effort to relieve the bladder was made because a diagnosis was not reached until the little one was dead.

This malformation usually leads to fatal results, and our knowledge avails us little save in accounting correctly for the cause of death. The only natural way that the evil effects of this malformation can be obviated is by the occurrence of another developmental anomaly, viz., fistula of the urachus, the urine then escaping from the umbilicus. Atresia is an undoubted factor in the production of urachal fistula. I shall speak more fully of this when I come to consider vesical malformations.

When defectus urethræ externus occurs in patients whose urogenitals are otherwise normal, the function of the bladder and reproductive organs may all be performed easily and uninterruptedly. Coitus has been possible, and conception has been known to occur in such cases.

Diagnosis.—In making a diagnosis of these deformities reliance can not be placed on the symptoms alone. A physical examination of the parts is necessary. The general relative appearance of the external organs must be observed, and if the vagina is large enough to admit the speculum it should be used, and if there is any malformation internally it can easily be discovered and its exact location and nature ascertained. There is usually very little trouble with such cases, but where the entrance to the vagina is so narrow that it will not admit a sound or speculum, the diagnostic skill of the physician will be severely taxed. Such cases resemble imperforate hymen, or acquired atresia of the vulva, and one case, at least, has been mistaken for an hermaphrodite. Under such circumstances an attempt should be made to pass the sound into the bladder, and by introducing the finger or another sound into the rectum the presence or absence of a vagina may possibly be made out. If the patient is an adult, and the case one of imperforate hymen, menstrual fluid will probably be found in the vagina. Should there still remain any doubt, the only resource would be to try dilatation of the introitus vaginæ, and see what lies beyond it.

Treatment.—The treatment may be either radical or palliative. Where there is an entire absence of the urethra, with the existence of vesical fissure, or in persistence of the sinus uro-genitalis with partially developed urethra, the production of an artificial canal has been suggested. This may be done by dissecting from the vaginal wall a flap from under the symphysis. It should be about one third of an inch in breadth, and after being turned with its epithelial surface inward, should be united with the freshened edges of the vesical fissure. It is objected by some authors that even if the operation is successful, the patient will be but little benefited, the new urethra being devoid of muscular tissue, and consequently lacking the power of contraction. The passing of urine into the vagina, however, will be done away with, and the general condition of the patient will be greatly improved by the use of an artificial urinal. This of itself is a great point in favor of the operation.

Heppner believes that the method of producing an artificial urethra by trocar puncture of the soft tissues and sewing up the vesical fissure is dangerous, because vessels of considerable size are liable to be injured; a further disadvantage being that the canal tends to close. The cases of Carbol and Middleton bearing on this point he puts aside as unreliable. He moreover maintains that reduction of the vesical fissure to the size of the urethra is a disadvantage, since the anterior wall of the fissure will be without any muscular tissue. The experience of those who have treated fistula has been, so far as he knows, that linear clefts, even of greater caliber, hold back the urine better than round openings of smaller size, the former allowing more complete coaptation of the edges.

In Heppner's case, there being only nocturnal incontinence, he contented himself with applying a bandage in the manner suggested by Sawostitzki. A girdle was put around the lower part of the abdomen, and to it was fastened a little olive-shaped compress, by means of a steel spring, something after the manner of a truss. When put into the vagina this compress pushed the posterior vesical wall toward the pubic symphysis, thus closing the opening and relieving the incontinence. The patient soon became used to the instrument, and obtained great relief from it.

Atresia of the urethra can only be cured by operation. Carbol operated in 1550 on a servant-girl in Beaucaire, who had suffered from this difficulty from her youth up. The urine flowed from a coxcomb-like growth, some four fingers in length, at the umbilicus. The stench that arose from her body was intolerable. Carbol perforated in the region of the urethra, and successfully removed the growth at the umbilicus by ligation.

In the case of a child, seven days old, who had never passed urine, and whose bladder was enormously distended, Middleton pushed a trocar through in the direction of the absent urethra, emptied the bladder, and kept the opening pervious.

Oberteufer's patient, who had atresia urethræ and urachal fistula, relieved herself somewhat by wearing a large sponge over the umbilicus secured in position by a bandage. In such cases as this the apparatus usually employed in urinary fistula should be made use of.

MALFORMATIONS OF THE BLADDER.

These malformations follow the general rule of being in most instances due to some defect in the normal process of development. Those which are of sufficient importance and especially demand attention are:

1. **Fissure.**—The most frequent and prominent anomaly of development in the bladder is that of fissure. It consists in partial or complete absence of the anterior vesical wall, and is usually accompanied by malformations of other organs. The anus and umbilicus in these cases, as a rule, lie nearer than normal to the pubic symphysis.

There are various grades of this affection. There may be simple fissure of the lower part of the bladder, with the opening about three quarters of an inch in breadth, as has been seen by Desault, Palletta, Gosselin, Coates, and others. In the cases reported by them the symphysis pubis was but loosely united. There may also be fissure of the clitoris.

A higher grade of this malformation is that in which the fissure is near the umbilicus, the lower part of the pelvic cavity and the pubic symphysis being closed, and the lower part of the bladder, urethra, and external genitals normal. This condition is next in order to patency of the urachus—fistula-vesico-umbilicalis. In the latter case, the urachus may remain pervious its entire length, and open into the ring of the umbilicus.

The highest grade is that in which the whole anterior wall of the bladder seems to be absent. In these cases the inferior abdominal region is generally much shorter, and the umbilicus nearer the base of the pelvis. The abdominal walls are divided, and the resultant fissure is filled up by the bladder-wall, the mucous membrane of which is puffed out and red, and gradually merges into the skin of the abdomen. It is often wrinkled, thickened, moist, shiny, and the edges dry and covered with thickened epidermis.

On each side of the lower portion of the everted bladder are situated the orifices of the ureters. They usually appear as little excrescences, but are sometimes hidden in the folds of the membrane. The pubic bones are imperfectly developed, and the pubic symphysis never closed, save by a ligamentous band, the bones lying from half an inch to three inches apart. These separations of the pubic bones, as has been shown by Dubois, Dupuytren, Mery, and Littré, are congenital.

As a rule, in such cases, the urethra is absent. The clitoris is either divided with a portion on each side of the upper part of the imperfectly formed labia, or there may remain but a trace of it, or, again, it may be entirely absent. The hymen can be seen beneath the fissure. The vagina may be absent, as in cases observed by Herder and Eschenbach, and the uterus may be divided by a septum. Atresia vaginæ and imperfect ovaries have also been found in such cases. This grade is known as eversio or exstropia vesicæ.

If there is simply a fissure of the bladder the organ may be prolapsed through the fissure (inversio vesicæ cum prolapsu per fissuram). This must be distinguished from inversio vesicæ cum prolapsu per urethram and exstropia per urachum. That this may be clearly understood, it must be remembered that inversion of the bladder occurs in three ways: First, by a protrusion of the organ through an opening or fissure in its own walls (the form now under discussion); second, by an inversion through the urethra; and third, by an inversion through a pervious urachus.

The ureters, as a rule, are considerably widened. Isenflamm found them dilated from three quarters of an inch to more than an inch; Petit as much as two inches; Flagani and Baille found them to be four inches; Desault three inches; and Littré two and one half inches, and containing small calculi. Their course, as a rule, is changed, sinking deeper into the pelvis, and thence rising up into the bladder. There are, however, exceptions to their enlargement. Bonn, in one case, observed as long ago as in 1818, found their length and breadth normal. Winckel also speaks of a case where both kidneys and ureters were normal.

The anomalies known as epi- and ana-spadias belong under the head of vesical fissures.

2. **Double Bladder.**—Cases of double bladder, says Voss, are be-

coming quite rare as pathological knowledge advances, for many of these were probably cases of pathological division of the vaginal wall.

Mollinetti mentions, in his "Anatomico-Pathological Dissertations," the case of a woman with five bladders, five kidneys, and six ureters. Blasius describes a case of perfect division of the bladder into two separate halves, which at the vesical neck ended in one common urethra. Each bladder had one ureter. The subject was a male adult. Isaac Cattier has found this anomaly in little children. One case was that of a child fifteen days old. The bladders were separated by the rectum to such a degree that a finger could be laid between them. Sömmering found this condition in a child two months old. In one that was born miserably nourished, and lived but twelve hours, Schatz found perfect division of the whole genital apparatus, double bladder, and double congenital vesico-vaginal fistula. In double bladder, the double allantois, instead of forming one passage, forms two, with a ureter opening into each.

Testa gives a case of perfect separation by the vaginal wall. Scanzoni found, in making a post-mortem examination on the body of a tuberculous woman, a division of the bladder into two lateral halves. He does not say, however, whether the division was complete or whether the septum was pervious.

Sometimes horizontal septa are formed that are due probably to a crumpling up of a part of the bladder while growing, or a commencing closure of the urachus lower down than usual.

Roser, of Marburg, had a case of urachal cyst, which, when enormously distended, reached as far as the umbilicus. By means of a small connection with the bladder it was filled when that organ contracted, and, finally, it and the bladder were emptied by contraction of the abdominal muscles. Vesical cysts and diverticula may be confounded with the anomalies resulting from arrest of development.

The slightest grade of anomaly is that in which, as Chonsky has observed, there is no full septum, but simply a band or seam, apparent externally.

Etiology.—The original urinary sac of the embryo, it will be remembered, is the allantois, which takes its origin as a *cul-de-sac* from the rectum, and is, consequently, an offshoot of the intestine. It is formed by the bagging of the cloaca, which bagging is due to the collection there of urine from the primitive kidneys. This allantois, especially in the human species, is double, and remains only a short time. After the fourth week of embryonic life, the layers coalesce, and the division ceases. Yet the original double form may remain for some time beyond the normal period, if there are any hindrances to union.

Roose and Creve maintain that the cause of this malformation is the failure of the pubic bones to unite. Meckel takes exception to this, and says that the bladder in its primitive condition shows itself as a simple, plain surface, which only becomes a cavity by the growing toward each other and union of its edges. Duncan and, at a later date, A. Bonn, and, still later, B. S. Schultze and Thiersch, held that vesical fissure had, as its primary cause, an atresia of the urethra, with great dilatation of the bladder, the distended organ pushing aside, first, the recti muscles, later, the cartilaginous pubic bones, and, finally, bursting. E. Rose, on the contrary, maintains that these cases of bladder-fissure are cases of perpetuated urachus, and are due to developmental failure in the bladder itself, remaining open as far as the urethra. He says positively that the edges of recent preparations of the bladder show a fresh, smooth surface, and that there is no trace whatever of any cicatrix or callosity. He mentions one case of tearing and rupture where the evidences were plainly to be seen. Moergelin, who was unable to find proof of rupture as a cause of this anomaly, says that, if there was a quantity of urine in the bladder, greatly distending it, there would be a reopening of the urachus or a bursting into the abdominal cavity, rather than a rupture through the abdominal walls. He looks favorably on the idea of a bursting of the allantois before the abdominal walls have closed in front of it.

Against this, however, is the fact that Hecker extracted a fœtus with atresia, having an enormously dilated, unruptured bladder. He found in the abdominal walls a cicatrized slit covered by peritonæum. This makes manifest the possibility of a rupture of the abdominal walls, and also of the bladder, occurring at a comparatively late date.

In the case related by Rose no information is given as to whether there was a normal umbilical cord or not, whether there was any urachal fistula, whether the abdominal ring was closed entirely, or whether the fissure was confined to the inferior part of the anterior vesical wall, as described by Gosselin, Bertet, and others. In their cases it was not possible for the fissure to have originated by the reopening of the urachus. In any event, most of the late authors are agreed that hindrance to the outflow of urine has most to do with the production of this anomaly, and it may, as Rose has shown, and as has been said before, arise from atresia or absolute absence of the urethra.

Another possible mode of causation of this malformation is by the falling of some of the larger abdominal organs into the pelvic cavity, compressing the urethra, and hindering its formation. E. Rose once found the right kidney in the pelvis, and Winckel has recorded a case described by one of his students, Dr. Krüger, where the left lobe of a considerably enlarged liver and a quantity of small intestines were so tightly wedged into the pelvis as to cause marked bulging of the perinæum. Such a condition, coming at a time when the urachus and urethral end of the bladder are firmly closed, must tend to form a vesical fissure.

Perfect eversion of the bladder may, however, be found at a very early date, even before the two halves of the allantois are joined, as in cases related by Friedlander, E. Rose, and Winckel. Lying between, and in front of the single- or double-everted bladder or bladders, there are sometimes found, as in Rose's and Winckel's cases, bands of perforated skin-folds, behind which a sound may be passed. Their presence may be explained in this way: That the underlying serous connective tissue (Rathke's membrana reuniens inferior), which closes the abdominal cavity before the development of the skin and muscular system, is the covering of all urachal fistulæ, open bladders, and persistent allantois. Then, where the urine pressure is the greatest, the bladders move upon each other, so that no further development can take place between them; but the abdominal plates develop themselves around and between them.

This intermediate development, owing to the imperfection of the lower connective tissue, becomes a band or rim where the two conically formed bladders push together, so that they can not become a symmetrical whole, but have an intermediate arch. In these cases the cause probably lies in the patency of the urachus and the eversion of the bladder; also the open condition of the abdominal walls, interference with the development of the lower parts of the musculi recti, and, later, the imperfect development of the pelvis.

There can, however, be a fissure of the abdominal walls without a fissure of the bladder, the closed organ protruding from the abdominal fissure (ectopia vesicæ).

Lately Ahlfeld has brought forward the hypothesis that eversion of the bladder is complicated with and dependent on a pulling downward of the ductus omphalo-meseraicus, making an obtuse angle inferiorly, whereby, the rectum being pushed forward, it pushes the inferior wall of the allantois before it. Communication between the rectum and the allantois ceases, and the allantois, becoming enormously distended, bursts. Ruge and Fleischer contend that in this affection the duct of the umbilical vesicle is implicated, and hold that the tense cord (duct) in question is a continuation of the urachus.

Winckel is of the opinion that bursting of the bladder at an early stage from urine-pressure is the weightiest cause in the production of bladder fissure. Against the idea of Rose, which is that eversio vesicæ does not take place from rupture, Winckel says that the presence of scars is not absolutely necessary to prove the point, for the abdominal walls are not yet joined, and therefore can not be ruptured; and, moreover, he has often seen children immediately after birth in whom the umbilical cord was normal, and yet an eversion of the bladder existed. He raises the query as to why we can not have rupture of the bladder at an early period, since we know that it occurs later in life, as in women with retroflexion of the gravid uterus.

Another fact that he advances in favor of the view that rupture of the bladder is due to urethral obstruction is that it occurs oftener in males than in females, the former having a canal much more favorable to such obstruction, for, of sixteen cases of vesico-umbilical fistula, given by Stadtfeldt, fourteen were males and two females. Dr. Wunder, of Altenberg, in 1831 observed the cases of two boys, aged respectively eight and eleven, with congenital eversion of the bladder. It is interesting to note that their mothers were sisters.

The various causes that give rise to vesical fissure produce also imperfectly developed pelvic bones, dislocation of the head of the femur, and other malformations from pressure. The excessive dilatation of the bladder drives the horizontal rami of the pubes asunder, and the changed direction and imperfect growth of the pelvic bones cause a lessened acetabular circumference and consequent slipping out of the head of the femur. Thus does Voss explain the dislocation occurring in one of his cases.

It will be found on touching the red mucous membrane of an exposed bladder that it is exceedingly sensitive. In such a case the urine may be seen oozing from the ureters and dribbling over the surface. The mucous membrane is often protruded and wrinkled up by the movements of the bowels, and can, in case the bladder-opening is great, be inverted through the fissure (inversio vesicæ per fissuram) or through the urachus (inversio vesicæ per urachum). If the fissure is small it may remain for years without any inversion. If the prolapsed mucous membrane is replaced and indirect pressure is made on the dilated ureters, the urine will spurt from the ureteric orifices.

Sometimes these patients have partial control over their urine:

as in cases where an umbilical hernia exists with umbilical fissure, the posterior wall of the bladder being forced into the opening plugs it up. Such a case is described by Paget. The hernial sac, which was about the size of a goose-egg, completely plugged the umbilical foramen by pressing firmly against the posterior bladder-wall. If the patient desired to urinate, the contraction of the bladder caused a gradual disappearance of the hernial tumor; and when it had entirely disappeared he passed urine from the umbilicus and then through the urethra. After the urethral flow began the stream from the umbilicus ceased, and no urine passed at that point unless strong pressure was made upon the abdomen.

Another way in which partial retention may be accomplished in imperfect eversion is by the greatly thickened muscular walls acting as a sort of sphincter. Such a case given by Voss is that of a female child, twenty months old. When lying down and quiet, the urine did not flow away so freely. The bladder-wall was nearly one inch in thickness, and the ureters, though three inches broad, were greatly narrowed at their point of entrance into the bladder.

In fissures situated low down there may be coincident inguinal hernia, as is illustrated by a case related by Bertet. This complication may act so as to aid in the retention of urine. From the constant flow of urine, the inferior end of the fissure and neighboring parts become moist, red, eroded, and sometimes incrusted and ulcerated. There are various painful sensations, as itching and burning, and the patient becomes a nuisance to herself and to those about her from the offensive urinous odor that is constantly given off.

The edges of the mucous membrane in time become changed, and resemble skin in appearance. At other points, oftentimes, the membrane is much changed, having upon its surface loose, villous growths, that bleed readily when touched, and give the impression of a malignant new-formation.

By reason of a separation of the pelvic bones there is an irregular, uncertain gait. The pelvic diametric proportions, as observed by Moergelin, are in these cases much changed, the transverse being much greater than the antero-posterior, the dissimilarity increasing as age advances, the proportion being sometimes trebled. Women with these troubles, however, have borne children.

A close inspection of the ureteric openings being possible in these cases, the interesting observation may be made that in action the kidneys seem quite independent, the one of the other, the right discharging urine and the left none, or the reverse, or both may discharge together.

Diagnosis.—the diagnosis of urachal fistula is comparatively easy, for the affection is at once recognized by finding the ureteric orifices with the urine flowing from them.

As to frequency, the following statistics are of importance:

In 12,689 new-born children, Sickles found this malformation to occur twice in twenty-seven cases of developmental anomalies.

In thirty-five hundred births occurring in the Dresden Institute, from 1872 to 1875, Winckel saw one case.

Velpeau, in the year 1833, mentions seeing and finding on record more than one hundred cases of this kind. Percy says that he has seen it twenty times in his own practice. Winckel saw five cases, three of which were girls, and two boys. Phillips saw twenty-one cases, all girls; but in Wood's twenty cases, only two were girls.

Prognosis.—The prognosis is usually unfavorable. The children are weak and puny, and, as a rule, die early. They are, however, seldom destroyed by the fissure itself. Many of them are born living, and can be kept alive, and some attain a fair age. Lebert saw in Salpêtrière Hospital, Paris, an old woman with this affection. Operative procedures and the various apparatus to prevent trickling of urine are of little avail. This, however, is only the case in total eversion. Urachal fistulæ, simple fistulæ, above the pubic symphysis, and even those situated inferiorly, where the pubic bones are united, may be readily cured by the ordinary operation for fistula.

Treatment.—Stadtfeldt operated in eight cases of urachal fistula, in seven of which he obtained perfect healing. In deep fistula he recommends freshening of the edges of the skin and mucous membrane, and attempting union by the first intention. In cases where the edges extrude themselves very much, he puts on either a clamp or ligature.

Winckel favors operative procedure since, in that way, the abnormal protrusion can be removed. Sometimes, as recommended by Paget, it will be sufficient to freshen the edges, put in insect-pins, ligature, and union may be expected in from two to four weeks.

In fissura vesicæ, superior or inferior, an attempt might be made to draw the edges together, and even to loosen the skin in front by incision, so as to remove traction from the edges. In that case it will be necessary to freshen the edges and put in sutures. The result, unfortunately, is not uniformly successful.

In earlier times, in cases of true eversion of the bladder, no one dared to operate, and the only alleviation granted to the patient was such as could be obtained by a properly-adapted urinal. Numerous appliances have been invented for this purpose, some of them very useful.

Gerdy was the first to operate for eversion by closure. Failing to bring an inverted bladder back into place, he tried to form a sufficient sac by partial excision of the ureters. The patient, a man, was attacked with peritonitis and nephritis, and died.

Jules Roux, in 1853, proposed cutting out the ureters, and uniting them with the rectum. Simon tried this once, and succeeded; but the patient died six months after from peritonitis and exhaustion. At a later date, he again attempted to treat this malformation by operative procedures. He made one inferior and two lateral flaps, but these became gangrenous. Ten years later, these attempts were more successfully made by John Wood and Holmes, and their results recorded by Podruzski.

The first one, however, who obtained a perfect result was Dr. Daniel Ayres, of Brooklyn. He cut a long flap from the under and lower side of the abdominal walls, turned the skin-side in, and united it with both edges of the bladder. A full account of this case will be found at the close of this chapter. Since then I have seen three cases, but as they were not patients of mine I had no opportunity to interfere surgically in their treatment.

Subsequently, Wood operated on a girl one year and a half old, whose bladder-fissure was continuous with the uro-genital sinus, so that the os and cervix uteri were always wet. He raised one flap from the neighborhood of the umbilicus, and another from the soft parts, and turning the skin-side in, covered them with a larger flap from the other side. The mucous membrane, however, pushed through inferiorly, and broke the fresh adhesions.

Ashhurst's case was more successful. He cut a piece from under the umbilicus, and joined it with two flaps from the sides (they being somewhat turned) so that their upper edges met each other in the median line. They were joined by sutures, and through each side of the upper flaps two pieces of malleable iron-wire were carried, then drawn through the lateral flaps, and twisted over little rolls of plaster. Traction was thus relieved. The flaps healed by the first intention. The sutures were removed on the eighth day. The rest of the wound healed by granulation. When in the upright position, incontinence of urine still continued; but when lying upon her back, the patient was able to retain urine for about two hours, her general condition being thus greatly improved.

Ashhurst gives a *résumé* of twenty cases of eversio vesicæ, operated on up to his time. Fourteen of these were successful—Ayres, Holmes, Wood, Morey, and Barker, each being credited with one. Three were unsuccessful, by Holmes and Wood; and three resulted fatally, by Richard, Pancoast, and Wood. In the last two death resulted from causes other than the operation.

In all cases when the skin is turned in, the growth of hair already present or to come will be apt to give rise to incrustations. Thiersch, in his six cases, allowed the flaps to granulate on their raw surface before applying them. When the flap-union is perfect, he advises closing completely the upper part of the bladder.

The diagnosis of double bladder may be made by urethral dilatation and exploration by the finger and catheter.

Destruction of the bladder-septa is not to be thought of. In case of the existence of urachal cyst causing difficult urination, one might try extirpation of the cyst by cutting into the abdominal walls, and after freshening their edges unite them with those of the bladder.

ILLUSTRATIVE CASES.

Extroversion of the Urinary Bladder. (By Daniel Ayres, M. D., LL. D.)—The patient was admitted to the Long Island College Hospital, November 1, 1858, and a history of the case recorded by the house surgeon, Dr. Ostrander.

She is twenty-eight years of age, born of healthy parents, both of whom were free from deformity; her height is below the average of females, and she is unmarried. She declares her health to have been always good, appetite and digestion excellent, bowels regular, and the catamenia in all respects normal.

She states that, on the 5th of July preceding, she was delivered of a well-developed child, having carried it to maturity without extraordinary difficulty. Labor commenced with free hæmorrhage (footling presentation), and lasted two hours, at the end of which time the child was born, having died in process of delivery. Perinæum uninjured. She reports having made a tolerable recovery, though for a long time weak, and her present appearance is somewhat anæmic.

Shortly after she began walking about symptoms of prolapsus uteri came on, becoming gradually worse, until the organ projected external to the vulva, attended with dorsal, dragging pain, difficulty of locomotion, and gastric disturbance.

In quest of relief, she entered the Brooklyn City Hospital on the 1st of September following her confinement, and remained there one month. Here she states that a variety of pessaries were tried, none of which could be retained, and finally a surgical operation was performed, the nature and character of which is not very apparent. A short article, descriptive of this case, appeared in the "Virginia Medical Journal" for January, 1859, written by the house surgeon of that institution. The writer states that an attempt was made to retain the prolapsed uterus "by removing an inch of mucous membrane from the bottom and sides of the vulva, and uniting them by two figure-of-eight sutures, which were removed on the sixth day, when no adhesion was found to have taken place." The writer continues: "The patient was allowed to get up on the fourteenth day, when the prolapsus was found to exist nearly as much as before," etc.

It is obvious that no effort was made to relieve the congenital deformity, and that she was discharged in much the same condition as when she entered.

Finally, a species of stem-pessary was contrived which was intended to support the uterus, while kept in position by strings passed around the thighs. This, however, proved very inefficient—the uterus slipping by the instrument upon the slightest extra exertion. Moreover, the parts had now assumed an irritable condition, partly due to increased friction of the apparatus, and undue attention to cleanliness, added to the causes already noted; altogether, her deplorable condition was scarcely susceptible of being made worse.

I may here remark that the figures, both before and after the operation, have been photographed from accurate plaster-casts, taken directly from the patient—a very difficult and delicate procedure, for which I am much indebted to the skill and kindness of my colleague Dr. Bauer, and our valuable assistant, Mr. J. F. Esslinger.

Fig. 246 is an exact representation of the parts at the time of presentation to the clinical class of the Long Island College Hospital, for the purpose of critical examination. The prolapsus, having been carefully and completely reduced, was found to retain its place so long as the patient maintained the recumbent position.

The distance between pubic abutments was estimated at about three inches.

The bladder (*a*) formed an oval, elliptical tumor, mammillated upon the surface, which in the recumbent position measured two inches in its long, and one inch and a quarter in its short diameter. This was soft, elastic, or bright vermilion color, and covered with a thick tenacious mucus; bleeding readily when rudely handled, and so exquisitely sensitive, that while under the full influence of chloroform, and insensible to the knife, a sponge passed over the exposed bladder excited reflex motions.

The integument immediately surrounding the bladder was found red and puckered, but very soft, delicate, and free from hair between the bladder and point of sternum. The labia majora (*o*, *o*,) thick, fleshy, and luxuriantly covered with hair, were gathered into folds swelling away toward either thigh; these were carefully shaved previous to taking the cast and performing the operation.

The nymphæ occupied isolated positions on each side of the vulva, and are designated in all the figures by the letters *b*, *b*.

Between these and the vagina below no trace of clitoris or urethra could be distinguished, but the whole surface was covered with mucous membrane, continuous with the vaginal lining.

Here, then, we had to contend with two formidable difficulties, either of which was a problem in itself, viz., aggravated prolapsus from an entire absence of an anterior support, added to the original congenital malformation.

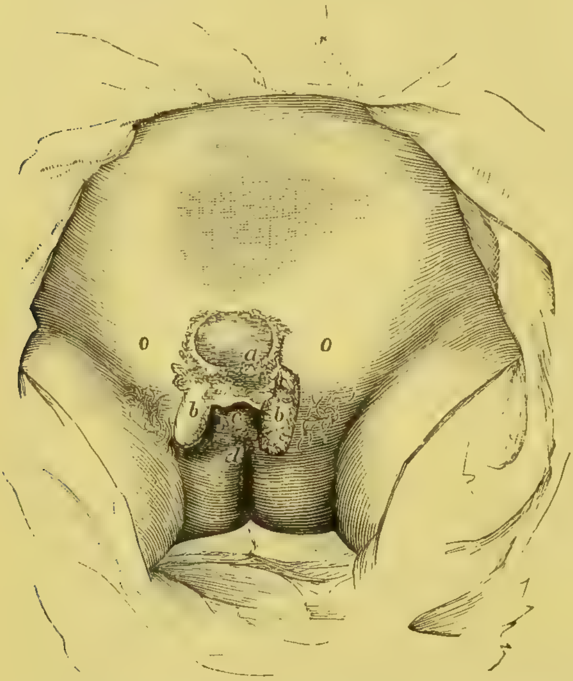

FIG. 246.—Extroversion of the bladder. *a*, Bladder exposed, forming a bright vermilion tumor; *b*, *b*, labia minora; *o*, *o*, above labia majora; *c*, vagina; *d*, anus.

To form an estimate of the value attached to surgical operations in these cases, we can not do better than quote the opinion of Prof. Erichsen, of University College, London. Having collected the experience of the profession on this topic, his eminent position at the center of surgical science, added to his well-known and extensively recognized erudition, renders him at once a reliable and compendious authority on the subject.

"This malformation," says he, "is incurable. Operations have been planned, and performed with a view of closing in the exposed bladder by plastic procedures, but they have never proved successful, and have terminated in some instances in the patient's death; they do not, therefore, afford much encouragement for repetition."

So unsatisfactory have been the results of these operations that the profession has not been favored with their general plan, their details, nor the causes of failure. It must be evident, however, that operations based upon the principles of plastic surgery alone offer prospects of success.

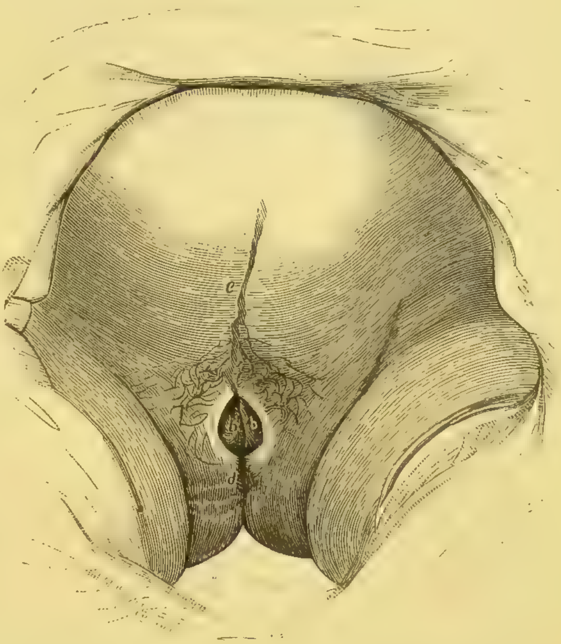

FIG. 247.—*c*, Linear cicatrix, formed by the flaps covering the bladder; *b*, *b*, nymphæ brought together, and inclosed by the vulva.

The most probable source of failure, and one which challenged our early attention, was the disastrous result to be apprehended from urinary infiltration, which, by its irritating character, would necessarily destroy all prospect of union, if it did not induce extensive sloughing of the abdominal parietes; peritonitis and purulent phlebitis are likewise probable sources of danger, unless carefully guarded against. Indeed, these may all become inevitable consequences of attempting to accomplish too much at one time; and it was therefore determined to arrange our proceedings with a special view, if possible, to avoid them. The indications which it was proposed to follow were:

1. To form an anterior wall for the exposed bladder.
2. To restore the urinary canal.
3. To establish the anterior fourchette of the vulva.
4. To supply means to prevent the prolapsus, and to collect the renal secretions.

The delicate character of the integument above the bladder and its well-known transmutability into the conditions of a mucous membrane peculiarly adapted it to supply the anterior cystic wall, and thus fulfill the primary indication.

With these objects in view, the operative proceedings were divided into two stages.

The first consisted in raising a flap from the anterior portion of the abdomen, including the superficial fascia, turning its cuticular surface down over the exposed bladder as far as its inferior border, and securing the lateral union of the flap in that position, while a free exit below was maintained for the urinary discharge; an important result, still further assisted by the dependent situation of the outlet of the ureters already alluded to.

By these means it was proposed to accustom the highly sensitive bladder to a gradual and methodical compression while the flap itself was insured ample space to undergo such swelling as might be anticipated from its new position and the unusual stimulation of a new secretion. Time was likewise given for the necessary transmutation of tissues to make some progress.

The steps of this procedure will perhaps be better understood by a more detailed statement of the first operation, in connection with the diagrammatic plates, Figs. 248 and 249.

It was performed on the 16th of November last, the patient being thoroughly under the influence of chloroform, and a sugar - loaf - shaped flap having been previously marked out upon the abdominal integument; its base, E, F, three inches in width, was situated three fourths of an inch above the cystic tumor, and extended five inches in length, with its apex toward the ensiform cartilage. The dark line E, H, G, I, F (Fig. 248), indicates its form, position, and the line of incision.

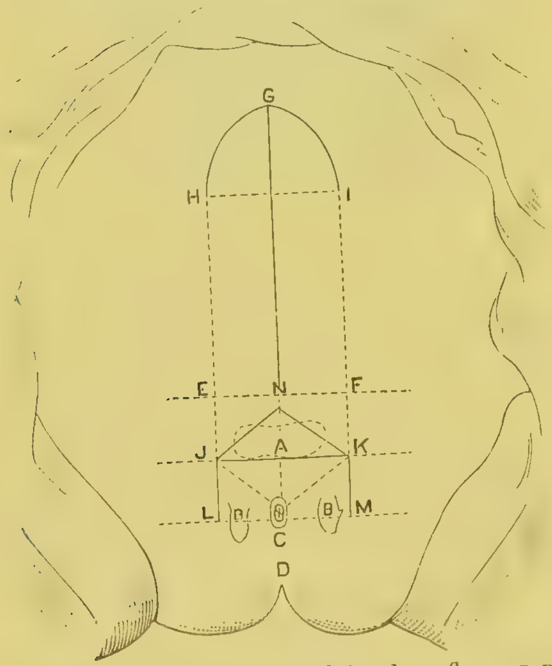

FIG. 248.—A, Bladder, covered by deep flaps; B, B, nymphæ; C, vagina; D, anus.

This flap being left sufficiently large to meet the elevated form of the bladder and allow for shrinkage, was quickly but carefully separated from its cellular attachments, down to the line E, F, while two lateral incisions, E, J, and F, K, were continued directly downward and toward the nymphæ, to serve as beds for receiving the sides of the new flap.

The integuments covering the lateral and inferior portions of the abdomen, extending from G to J on one side, and from G to K on the other, were now sufficiently separated from their cellular attachments to the muscles beneath to insure their sliding freely, and meeting without tension at the mesial line, G, N (Fig. 248). When brought into this position they completely covered from view the raw surface of the flap already turned over, and investing the bladder, with the exception of a triangular space, J, N, K (Fig. 248), formed by the coaptation of the lateral flaps; this was temporarily covered by reflecting back upon itself the corresponding triangular free end of the deep flap, J, C, K (Fig. 248), and attaching it along the line, J, N, K. Numerous points of interrupted suture were used to retain the parts *in situ*, assisted by long strips of adhesive plaster, compresses, and a retentive bandage around the body. It will be observed that the lower portion of the cystic tumor was thus temporarily left free and partially exposed, while no portion of cut or denuded surface remained uncovered.

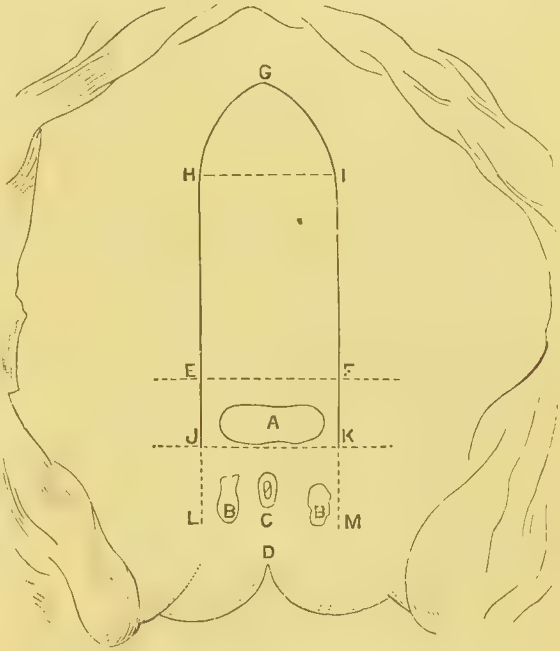

FIG. 249.—A, Bladder; B, B, nymphæ; C, vagina; D, anus.

The patient received a large dose of opium, and was strictly maintained in the recumbent position upon a bed, properly protected; such additional measures being adopted as would secure cleanliness.

As the parts subjected to operation began to swell, she complained of irritation and pressure upon the bladder, which, however, were promptly met with morphine alone, and subsided in the course of a few days. Now was exhibited the great importance of leaving the tumor partially uncovered, while all the cut surfaces were in close contact, and thus freed from the action of irritating secretions; important facts duly dwelt upon and recently enforced with great stress by the distinguished Prof. Syme, of Edinburgh, whose contributions to the surgical treatment of the urinary organs have alone placed both hemispheres under permanent obligation to him.

On the fourth day after the operation all sutures were removed, the wounds having healed by first intention or primary adhesion, with the exception of a spot the size of a ten-cent piece, situated just above the point of the triangle, and where the deep flap had been reflected over the bladder. At this point the lateral abdominal flaps were necessarily raised up from the tissues beneath, and could not be brought into contact even by the use of compresses. This, however, granulated kindly, and was nearly cicatrized on the 7th of December, when the second and last operation was performed, as follows:

The patient being under the influence of chloroform the lower triangular flap, J, N, K (Fig. 248), was dissected from its recent and temporary attachments, both lateral and deep, and turned down over the vulva as indicated by the dotted line, J, C, K.

Two incisions, J, L, and K, M, were now carried from the external angles of this triangle, perpendicularly toward and terminating just behind the nymphæ, B, B.

The lateral flaps bounded by the lines N, J, L, and N, K, M, and including the labia majora, were then freely dissected from over the abutments of the pubic bones until they could be readily slid to meet each other at the central line, N, C, which, being a continuation of the line G, N, reduced the whole to a single linear wound, occupying the "linea alba." (See Fig. 247.)

During the operation several arterial branches bled freely, and were arrested by torsion and the free application of ice, after which the flaps were confined at the mesial line by points of interrupted suture, the most inferior one, viz., at L, and M, being made to include the apex C, of the triangular flap.

Fearing to depend on sutures alone to secure the approximated flaps, and the use of adhesive plaster being excluded by the irregularity and position of the parts, the whole surface between the points of suture was hermetically incased by strips of patent lint, soaked in collodion and accurately applied. In addition to this, pieces of muslin were by the same method firmly attached to the labia majora, at some distance from the mesial line, and to these sutures silk was fastened in such manner as to form a lacing across and over the wound. By means of this dressing all tension was removed from the sutures, urine was totally excluded, while rapid and perfect adhesion soon followed.

Thus a urinary canal was formed which would admit the little finger to be passed up one inch and a half. The anterior fourchette of the vulva was firmly established, and the mons veneris assumed its prominent and natural appearance.

The last cast of the parts representing her present condition (Fig. 247) was taken on the 4th of January, 1859, previous to which time, the parts being all firmly united, she was permitted freely to walk about, and left the hospital to spend the holidays with her friends. No artificial support whatever was applied, in order to ascertain how far the operation would succeed in preventing the prolapsus.

After a severe test, the anterior fold of the vagina alone descended, and that for a short distance, forming a pale, œdematous tumor, occupying the vulva, about the size of an English walnut. The anterior fourchette of the vulva remaining firm and resisting, a light, oval pessary, made of vulcanized rubber, and perforated, was introduced into the vagina and readily retained *in situ.* After thorough trial, this was found to support the parts completely, and without the slightest uneasiness, even under active exertion and straining.

This was a better result than had been anticipated, inasmuch as it was intended to rely mainly upon a disk-shaped pessary, supported by a foot attached to a simple apparatus which we had constructed to act as a reservoir for the urine.

January 20, 1859. The patient was again examined at the hospital, in the presence of a number of medical gentlemen, she having walked a distance of two miles without experiencing any inconvenience. The parts were all found sound and firm, and her general health and spirits much improved.

Patent Urachus with Calculus. (H. D. Vosburgh, M. D., "New York Medical Record," September 22, 1877.)—Several months ago I was called to see J. H. B., fifty, a mechanic, of spare habit, and always in good health. He complained of soreness and constant pain at the umbilicus, and on examination I found the natural depression filled up by a rounded tumor, apparently the natural tissue enlarged by swelling. There was also circumscribed hardness of the tissues around the umbilicus. The parts were red and very tender to the touch, having every appearance of an ordinary erysipelas.

At the time of my visit he told me that a score or more of years before, after a similar experience, his attending physician at that time removed a "stone" from the umbilicus. I applied a poultice, and awaited developments. The above condition continued from day to day, with the exception that the tumor projected more and more from the umbilicus, and the circumscribed hardness decreased. Any movement of the body or handling of the tumor produced severe cutting pain in the part, The tumor was exquisitely tender. No constitutional symptoms accompanied the trouble.

On the tenth day from my first visit I made an incision into the tumor for the purpose of exploration, about half an inch in depth, when I came upon a hard substance which, after considerable difficulty, I removed, and found to be a concretion, smooth and ovoid in shape, about the size of a medium hickory-nut, and of the color and appearance of a phosphatic calculus, with a strong urinous smell. After the removal the wound readily healed. The ordinary retraction of the tissues within the navel fossa took place, and the man has suffered no inconvenience since.

What was the concretion? In the "Medical Record," No. 354, Dr. Rose's article describing a patent urachus called this case to mind, and I have transcribed the above from my notes of the time.

I can not conceive this concretion to have been anything else than a calculus formed from urinary deposit in a patent urachus.

No treatise within my reach mentions anything of the kind, and the novelty of the case is my reason for reporting it.

In this man there was doubtless a similar calculus formation something more than twenty years before.

Very Rare Form of Monstrosity of the Female Genito-Urinary Organs ("Gazette des Hôpitaux.")—In the words of M. Tillaux, at the Hospital Lariboisière, there is at present a small, deformed woman, twenty-six years of age, who presents an exstrophy of the bladder, with complete absence of the vagina. The external organs of generation are represented only by the orifice of the uterus, which is situated in the median line almost on a level with the skin, and by rudimentary labia minora and majora which are not united in front. The clitoris, urethra, and anterior wall of the bladder are absent. The ureters open into the rudimentary bladder near the median line. Palpation shows that the pubic bones are separated in front by a space that is about as wide as five fingers, and the pelvis seems to be enlarged to that extent. The umbilical cicatrix is located at the middle of the superior border of the exstrophic bladder. The cervix uteri forms a slight prominence into which the skin is attached. It is conical in form. The cavity of the uterus is of nearly the normal depth, but rectal examination shows that in shape the organ retains the peculiarities of childhood. The patient began to menstruate at the age of fifteen years, and since then has been perfectly regular.

Operative Treatment of Ectopia Vesicæ. (By Prof. Trendelenburg, Bonn; "Centralbl. f. Chirurg.," 1885, No. 49.)—Former methods are criticised. Thiersch's flap-closure, e. g., does not secure use of the bladder musculature. Trendelenburg's first attempts to secure direct union of a vesical and urethral fisssure by joining its lateral edges were begun five years ago. His plan is by dividing the sacro-iliac synchrondrosis on each side to mobilize the iliac flanges, and then by lateral pressure to approximate them in front. Finally, the fissure thus narrowed is, after reposition of the bladder to be directly closed by freshening and suturing its edges. Inferiorily the union is to be continued at least to the beginning of the pars bulbosa urethræ. Division of the sacro-iliac symphysis is in children simple, and, when carefully done, not dangerous. The child is laid on its belly, and a finger introduced into the rectum to determine the position of the incisura ischiadica major and superior gluteal artery. A long cut is then made over said symphysis; this is gradually deepened until strong lateral pressure makes the pelvic flange yield. On account of the large pelvic vessels it is not permissible to cut through the deepest portion of the symphysis. Toward puberty and later in life this operation would have to be done with the chisel, and would be more serious. The construction of a continuously active compressing apparatus that could be tolerated for weeks proved difficult. Tourniquet arrangements were not borne. A girdle crossing in front, with extension weights of ten to fifteen pounds attached, has of late proved satisfactory. Where previously the spinæ sup. ant. were seventeen centimetres apart, they approached to within eleven and a half centimetres. The two pubic symphysis stumps, formerly two inches apart, were now almost in contact. It is well to delay the operation for the fissure some six or eight weeks. This second operation begins with freshening the fissure borders; he then frees the edges of the bladder somewhat, and unites with Lembert's sutures. The urethra has usually been included in the operation. A catheter is left for a few days. In all cases as yet the union to the extent of urethra and bladder-neck has subsequently separated. In a two and a half year old boy the remainder of the bladder held and the prolapse was remedied. He thinks that by further perfecting his operation it may prove successful.

Operation for Congenital Extroversion of the Bladder of an Infant Five Days old.—(By H. C. Wyman, M. D., Detroit, Michigan, "New York Medical Record," December 12, 1885).—From the umbilicus down to the triangular ligament there was a failure of development causing an extroversion of the posterior wall of the bladder, showing the orifices of the ureters and an absence of the dorsum of the penis. Dribbling of urine from the ureters was constant. Under chloroform incisions were made on either side through the integument and superficial fascia just forward of the anterior superior spine of the ilium two inches upward, to secure relaxation; the edges of the fissure were then pared and fastened together with harelip pins with intermediate sutures, and the wound dressed with oxide of zinc and absorbent cotton, a drainage-tube for the urine being left in the wound. The penis was not touched, being reserved for a secondary operation. The recovery was rapid and perfect. The child died from convulsions two months later, before the operation upon the penis could be performed.

CHAPTER XXXVIII.

FUNCTION OF THE BLADDER.

The function of the bladder is to act as a reservoir for the urine, and at proper intervals to expel it through the urethra. The filling of the organ with urine is a comparatively slow and gradual process, the fluid entering it from the ureters drop by drop, or in a very small stream. As it enlarges it does so in the direction of least resistance, viz., laterally and superiorly. The lateral being its longest diameter, it enlarges first in that direction, until after a time a limit is set by the bony pelvic boundaries, when it rises from the pelvis somewhat, thus escaping from the pressure below. This movement of the bladder is facilitated by its serous surface gliding easily over that of the adjacent organs.

The bladder receives its nervous supply partly from the mesenteric ganglia of the sympathetic, and partly from the lumbar portion of the spinal cord; it has therefore nerve-filaments from both the cerebro-spinal and sympathetic systems. The sphincter vesicæ is in health in a state of tonic contraction which results in retaining the urine in the bladder. This act is entirely involuntary and unconscious, and is performed in a perfect manner both during the waking and sleeping hours. When it is desired to evacuate the bladder this sphincter is relaxed by an act of the will conveyed through the cerebro-spinal fibers, but this relaxation once accomplished, the further act by which the organ is emptied is performed without the intervention of the will. The experiments of Kupressow demonstrate conclusively that the nervous center which presides over contraction and relaxation of the sphincter vesicæ is located in the lumbar region of the spinal cord. And it may be accepted that with other functions of a protective nature the spinal cord maintains the normal action of the urinary organ.

There has been considerable discussion among different authors as to whether closure of the vesical urethral orifice is a voluntary or an involuntary act. Witte and Rosenthal maintain that the closure is due to "tonicity from nerve force," which resists the urine pressure. Kupressow holds the same view, basing his opinion on a series of experiments which he made, and further maintains that the sphincter vesicæ is at the neck of the bladder to eject the urine completely out of the urethra, in place of standing guard and holding the vesical outlet closed. By others it is claimed that this musculo-elastic ring hinders the entrance of urine into the urethra, but that the tension of the bladder-walls when the organ is filled overbalances this elasticity, and a drop of urine escaping into the urethra brings the necessity for urination to the senses, and the act then becomes a voluntary one.

It has been found, however, in cases of urethro-cystic vaginal fistula, where the upper part of the urethra and neck of the bladder were totally destroyed, that, after the healing of the parts, the anterior or lower end of the urethra was practically able to control the urine.

The act of emptying the bladder is a very important and interesting process, and is not so simple as might at first be imagined. As the organ has three openings and is emptied by the concentric contraction of its muscular coat, the urine is not only expelled through the urethra, but there is a tendency to regurgitation or backward pressure of the fluid into the ureters. The backward flow is effectually prevented by a very complete and interesting arrangement. The protection is threefold: First, by the oblique direction that the ureters take in piercing the vesical wall; second, by the two muscular slips already mentioned, that pass from the sphincter vesicæ to the insertions of the ureters. As the bladder gradually fills these slips are tightly drawn, and thus partially or wholly close the ureteric orifices. Moreover, it may be presumed that as these muscular fasciculi have their origin in the vesical neck, they act most vigorously during urination, when the bladder pressure tends to cause regurgitation into the ureters. Their greatest use is, in all probability, during the act of micturition. This view is borne out by the fact that these little muscles are in a rudimentary condition in the female, the urethra being shorter and the force necessary to empty the bladder much less than in the male; and further, by the well-known fact that when the hypertrophy of the muscular walls of the female bladder does occur, these fasciculi are proportionately enlarged. Third, by a ligamentous band, not described in the textbooks of anatomy, which runs from one ureteric opening to the other, inclosing their vesical ends, and is known as the inter-ureteric ligament. Its mode of action is this: As the bladder gradually fills, the openings of the ureters are carried farther apart, and with them the ends of the ligament. Being elastic, it yields to a certain extent, and after a time, being able to yield no more, pulls upon both openings, closing them more or less completely. During urination the tension of the ligament gradually decreases, and then the muscular fasciculi and the oblique direction in which the ureters enter the bladder come into play, the ligament being of use only during filling and distention.

If from any cause the bladder is not emptied at the proper time, the organ is not only injured by overdistention, but more serious results may follow if the retention continues for some time; although the bladder is too full to receive any more urine, the kidneys continue to secrete until not only the bladder, but also the ureters, renal pelves, and kidney tubes become overfilled. When the pressure on the urinary side of the Malpighian tuft equals that of the blood-stream in the glomerulus, secretion of urine at once ceases, and we have a mechanical suppression. After death the bladder, ureters, and renal pelves are found to be greatly distended, and the kidney pale, of a bluish, pearly color in the cortex, and oozing urine from the cut surface.

Maas and Punier (New York Medical Record, October 1, 1881) have performed experiments on animals and men which demonstrate to their satisfaction that the bladder, whether healthy or diseased, as well as the urethra, possesses the faculty of absorption in a greater or less degree, varying with the substance used. Their methods when experimenting on animals were as follows: The bladder was fully exposed, both ureters tied about half an inch above their termination, then divided above the ligatures, and the urine conducted outside of the body by means of glass cannulæ introduced into the central ends. The bladder was then evacuated by a catheter through which the solution experimented with was injected, the catheter withdrawn, and a ligature drawn tightly around the urethra between the prostate gland and the neck of the bladder; sometimes after tying the ureters and urethra the bladder was emptied by a Pravaz syringe, the medicated solution injected through the cannula of the latter, and the puncture closed by ligature.

In a second series of experiments the abdominal cavity was not opened, but after drawing off the urine the solution was injected through the catheter, and the mouth of the latter plugged. The substances used were ferrocyanide of potassium, salicylate of soda, cyanide of potassium, strychnine, atropine, curare, apomorphia, and pilocarpin. All of these substances were absorbed, but some so slowly that their physiological action was not manifested; thus atropine seemed to have no effect upon the animal, but a small quantity of its urine collected during the continuance of the experiment and instilled into the eye of another animal rapidly caused dilatation of the pupil. The diseased bladder was also found capable of absorbing the same substances.

In their experiments on man, Maas and Punier used iodide of potassium and pilocarpin. As regards the excretion of the former, they call attention to the fact that in some individuals it rapidly passes off by the urine, in others by the saliva, and in others by only one of these paths to the exclusion of the other. The method used was the following: Taking only individuals with healthy bladders, the latter were evacuated by a Nélaton catheter, after which in twenty-eight cases they injected fifty grammes of a ten-per-cent solution of iodide of potassium, following this up in thirteen other cases with an injection of one or two centigrammes of muriate of pilocarpin half an hour later. The iodide was detected in the saliva in fifty-seven per cent of the first and seventy-seven per cent of the second series, but usually in small quantities only. The diseased bladder was found to absorb much more promptly; iodide of potassium was detected in the saliva when only 2·0 were used. A solution of 0·4 morphine in 2·0 of distilled water used in this way acted very plainly as an anodyne. Pilocarpin made up into a bougie with cocoa-butter, and introduced into the urethra (both healthy and diseased), manifested its specific effects.

L. Schafer found that after producing vesico-vaginal fistulæ in animals there was increase of from two to three per cent, and sometimes from four to five per cent, in the amount of urine passed over that passed before the fistulæ were made; and he feels convinced that under normal conditions of urinary secretion the amount of urine in the bladder is gradually diminished by a slight though regular absorption of its watery elements. If this be true, we may look to a too rapid absorption as one of the causes of gravel and urinary calculi.

On the other hand, however, Susini found that after injecting potassium iodide and belladonna into his own bladder and retaining them for many hours, no trace of the former was found in the saliva, and no appearance of the specific action of the latter was made manifest. Alling agrees with Susini, and the experiments of P. Dubelt also support this view. After careful consideration of the evidence *pro* and *con*, I am strongly inclined to the view that the bladder does not absorb anything, save possibly a little water, unless its epithelial surface is displaced or destroyed. When abrasion does occur, absorption is rapid and its effects marked. The fact that the mucous membrane of the bladder is able to absorb liquids after erosion of its epithelium throws much light on the cause of some of those peculiar constitutional symptoms accompanying chronic cystitis, and known by some authors as ammonæmia.

The inner surface of the bladder is lubricated by a very thin secretion of mucus. This can be demonstrated by putting some fresh, normal urine in a clean bottle. In a short time a slight hazy cloud will settle to the bottom. When examined microscopically it will be found to consist of a few epithelial scales and mucous fibrillæ—long, fine, and often interlacing. In disease this secretion becomes greatly increased, and is then thick, viscid, and ropy. The normal secretion when tested chemically is found to contain an abundance of the earthy and alkaline phosphates.

A healthy woman urinates from four to six times in every twenty-four hours, and passes in all from thirty-five to sixty ounces of urine, the average being about forty-five ounces. The amount passed varies much with the season of the year, more being passed in winter than in summer; it varies also with the amount of fluid ingesta, rest, and exercise. Neither limpid nor concentrated urine are well borne by the bladder.

The pressure of the urine in the bladder being of importance in both health and disease, I deem it advisable to give here the results of some experiments by Schatz, Odelbrecht, Hegar, and Dubois. These experiments were made with the manometer, an instrument which by means of a column of mercury may be adapted to register the exact pressure in the bladder.

They found the pressure to be from twelve to sixteen inches while standing; in the recumbent posture it was only from four to six inches. The pressure in the recumbent position Dubois believed to be due not to visceral pressure from above, but to the natural tonicity of the distended organ; for in the cadaver, after removing the other viscera, the pressure in the bladder indicated four inches, plainly due to the elasticity of the organ itself. The same has been observed in cystocele, in which the visceral pressure is also absent.

The pressure is about the same in both sexes and at all ages. It was found to rise from one half to one inch with each inspiration, and to fall about the same with each expiration. In laughing, coughing, etc., it rose as high as from twenty to sixty inches. In diseases of the spinal cord, such as myelitis, and after injuries to the vertebræ, Dubois found a marked decrease in bladder pressure.

These curious observations on the varying degrees of pressure arising from change of posture are not without value. They help one to understand why, in some diseases of the bladder, patients should maintain the recumbent position.

CHAPTER XXXIX.

FUNCTIONAL DISEASES OF THE BLADDER.

It has been the rule among pathologists to class under the head of functional diseases all those in which no lesion of structure was discoverable in the organs concerned. Although we are still obliged to accept this nomenclature, the progress of pathological knowledge in the past few years has weeded out many of the so-called functional affections: and as this knowledge advances, and new and efficient means for observation and study arise, we shall be able to root out many more, thus doing away with much of the vagueness and uncertainty in which this class of affections is shrouded. But even with the improved facilities for diagnosis at our command, there are still many diseases in this list. Owing to the obscurity at present surrounding the subject of reflex or sympathetic disorders, i. e., the abnormal condition of an organ or organs, near or distant, affecting the function or nutrition of another organ, we are obliged to put these affections in this class also. Under this head then will be considered:

I. Derangements of function in which there is no recognizable organic lesion.

II. Derangements of function due to diseases of the nutritive and nervous systems, and to abnormal conditions of the urine resulting therefrom.

III. Derangements of function due to inflammatory and other affections of the pelvic organs, such as metritis and pelvic peritonitis.

It will be observed that in this arrangement of the subject, although a number of structural diseases are considered, they all stand in a causative relation to the disturbed action of the bladder, the latter being free from any organic lesion, and only disturbed in the discharge of its duty by influences outside of itself.

Before discussing these functional disorders in detail, it will be necessary to fix clearly in the mind their various manifestations; these are: frequent urination, or polyuria; difficult urination and retention, or ischuria; painful urination, or dysuria; pain after urination, or vesical tenesmus; and incontinence of urine, or enuresis. These deranged actions may also be due to organic diseases of the bladder, but they will at present only be discussed in connection with the three classes of functional derangements of that organ just referred to:

I. Derangements of function in which there is no recognized organic lesion. There are five of these derangements which demand special consideration.

1. Neuroses, pure and simple.
2. Derangements due to hysteria.
3. Derangements due to disorders of the sexual function.
4. Derangements due to malaria.
5. Derangements due to ovarian affections.

1. **Neuroses.**—By this term I refer to purely nervous affections of this organ. They are rather rare, it is true, but that they do exist there is no doubt, for there are certain conditions that seem to depend on no other known pathological cause.

We learn from the books that vesical neuralgia is of this class. It is known by a variety of names, each taking as its key-note some peculiar manifestation or symptom, as irritable bladder, cystospasm, cystoplegia, and neuralgia vesicæ.

The term irritability so commonly used in speaking of the healthy organ must not be confounded with the condition known as irritable bladder. The former refers to a certain property that the viscus possesses, by means of which it is able to respond to certain stimuli, while the latter refers to an abnormal condition of sensation, viz., super-sensibility, or hyperæsthesia.

2. **Derangements due to Hysteria.**—Hysteria holds a prominent place among the causes of functional derangement of the bladder, the vesical affection being probably only a fragment of a general neurosis. Acute and chronic diseases of the brain and spinal cord also produce various vesical difficulties of this nature, but these will be discussed under another class. Any one who has suffered the mortification of an involuntary evacuation of urine from fear, will understand how the brain and nervous system can influence the bladder.

In the variety of conditions grouped under the head of hysteria, it is often observed that frequent urination is a prominent symptom. The cause, in many cases, is the peculiar character of the urine secreted in this disturbed condition of the nervous system. The limpid urine of hysterical patients is deficient in solids, the watery portion being greatly in excess. This unnatural composition renders the urine irritating to the bladder so that it can not be long retained. The quantity of urine secreted is, at certain times, excessive, which, together with its irritating quality, renders urination necessarily very frequent.

But apart from the frequent urination which occurs in severe attacks of hysteria due to the conditions just mentioned, cases are often seen of frequent micturition which can only be accounted for by the state of the nerves which govern the action of the bladder. When the quantity and composition of the urine are normal, and the patient can retain it without pain or distress during the night, but has to pass it every hour or two during the day, it may safely be presumed that the trouble is functional, and due to a disordered state of the nervous system. The only condition which resembles this history is occasionally seen in prolapsus uteri, the patient being free from trouble while reclining, but having to urinate frequently when in the erect position.

Hysterical patients frequently suffer from retention of urine. Some of them complain for a time of difficulty in emptying the bladder, and finally fail to do so altogether. At other times they suddenly find that they can not urinate. There are conflicting views regarding the cause of this retention, some believing that such patients can not urinate, and others that they will not. Those who believe that the trouble is feigned and not real, do so on the ground that in this morbid state of the nervous system the patients enjoy catheterization, which would be distressing to any one of healthy mind and body. Others claim that in the extreme sexual excitement which occurs in some cases of hysteria, the chronic erection of the clitoris makes pressure upon the urethra, and prevents the flow of the urine through the canal which is at that time compressed.

I am satisfied that both kinds of cases occur. There are those who complain of retention when they know that the doctor will use the catheter, but they can urinate easily when they please. Others I have seen who were suffering from excessive and painful distention of the bladder and would have gladly relieved themselves if they could.

3. **Derangements due to Disorders of the Sexual Function.**—Another class which resembles the hysterical patients in the frequency of urination, but differs in every other respect, is found in those

who suffer from the habit of masturbation. The constant congestion and irritability of the pelvic organs, caused and kept up by the unnatural and excessive exercise of the sexual function give rise to frequent urination. Such patients complain of general weakness, which is not accounted for by any organic disease of the general system. Nor is there disease of the bladder; it is simply enfeebled and irritable like the rest of the pelvic organs. To make a correct and positive diagnosis in such cases is by no means easy, because it necessitates our detecting the habit of masturbation, and this is usually one of the most difficult tasks for the diagnostician. It is not always prudent to question the patient regarding the habit; and even when that is done they frequently fail to comprehend the question, or they answer falsely in the negative. The physician is thus generally left to guess at the truth of the matter.

The symptoms developed by masturbation are depression of the nervous system, manifested by lassitude, sadness, or emotional expressions of joy and sorrow, those affected with this habit being easily affected to smiles or tears. The eyes are dreamy and heavy, and the pupils dilated. Such subjects are excitable, irritable, and easily exhausted. They often have headaches. Nutrition is apparently good in some cases, as is shown by the fair supply of flesh; still, they often suffer from acute indigestion, although at times the appetite is remarkably good. The bowels are usually constipated, and the muscles soft and flabby. The exhalations from the skin are sometimes changed, so that a peculiar odor is noticeable about such persons. This odor can not be described, but, when once recognized, is easily remembered.

In this variety of functional derangement of the bladder, as well as in all the other varieties of neurotic affections, the symptoms vary in severity to a great extent in the same individual. The trouble is by no means regular and constant in its manifestations, as in organic diseases. Whatever disturbs the nervous system will increase the disorder. The rule is that frequent urination is the prominent symptom, but occasionally painful micturition is complained of. It is then simply a slight scalding pain, experienced when the urine is passing over the irritable or chafed mucous membrane about the meatus urinarius.

4. **Derangements due to Malaria.**—Another cause which I believe acts through the nervous system is malaria. The effect of malarial poison on the bladder and urethra is very peculiar. The trouble produced in this way has been called urethral fever, and is described as an inflammation of the mucous membrane of that canal. It might

more properly be called malarial fever of the urethra. As I have observed this affection, the bladder and urethra are usually both affected, but I do not consider the disease one of a well-defined inflammatory character. There are usually symptoms of malaria present, but not necessarily chill and fever. On the contrary, I believe that I have observed the affection more frequently in remittent than in intermittent fever, and very often, where the constitutional symptoms were not more than a slight derangement of the digestive organs, with moderate elevation of temperature in the after-part of the day.

The symptoms vary, but usually are as follows: The patient complains of frequent desire to urinate, and some vesical tenesmus; severe burning pain on passing water, with stinging and burning in the urethra after urination. The history of such cases resembles acute gonorrhœal urethritis so far as the abruptness of the attack and the tenderness and pain of the urethra are concerned, but there is usually no discharge, or, at least, very little. In many cases the suffering is greatest in the afternoon and early part of the night. Under proper treatment the disease disappears as promptly as it comes on.

5. **Derangements due to Ovarian Affections.**—In disease of the ovaries we sometimes find that the bladder suffers very much from deranged nerve action. The clearest and best account of this form of functional bladder trouble is given by Fothergill in his paper on "Ovarian Dyspepsia," published in the "American Journal of Obstetrics," January, 1878. In speaking of the derangement of the stomach and pelvic organs, he says: "It soon became clear that there was some condition existing which stood in a causative relation to both the dyspepsia and the uterine disturbance. That condition was quickly seen to be a state of vascular excitement in one or both ovaries, usually the left ovary. This condition Barnes terms 'oophoria.' In this state there is always more or less pain constantly in the iliac fossa, more rarely on the right, much aggravated at the catamenial periods, when the pain shoots from the turgid ovary down the thigh of the corresponding side along the genito-crural nerve. This painful state is otherwise known as 'ovarian dysmenorrhœa.' When pressure is made over this tender ovary during the catamenial flow, acute pain is experienced. Pressure also elicits pain during the intermenstrual interval. At the same time that acute pain is felt, evidence is furnished of emotional perturbation; the patient feels as if about to faint, or 'feels queer all over,' as some express it, and the changes in the patient's countenance speak of something more than

more pain, pure and simple. It is evident there is a wave of nerve-perturbation set up, which excites more than the sensation of pain. Commonly the patient feels sick after the momentary pressure, and asks to be permitted to sit down, alleging that she feels sick and faint. If a careful physical examination be made, it will be found that there is an enlarged and tender ovary, which may sometimes be caught betwixt the finger in the vagina and the fingers of the other hand applied to the abdominal wall of the ovary. Such manipulation elicits manifestations of acute suffering from the patient. Frequently the rectus muscle over the tender ovary is hard and rigid, so as to place the organ as perfectly at rest as is possible; just as we see the rectus to stiffen and become rigid over the liver when there is an hepatic abscess, and thus to secure rest, as regards movement, for that viscus. . . .

"Not rarely, too, there is set up a very distressing condition, viz., that of recurring orgasm. This occurs most commonly during sleep —'the period par excellence of reflex excitability.' In more aggravated cases it also occurs during the waking moments, and this it does without any reference to psychical conditions.

"The centers of the pelvic viscera lie near together in the cord, and the condition of one is readily communicated to another. The brief recurrent orgasm affects the bladder-centers, and the call to make water is sudden and imperative, and must be attended to at once, or a certain penalty be paid for non-attention. This last is not a common condition, fortunately, but it is a source of great suffering, bodily and mental, when it does occur. The condition of the ovary also acts reflexly upon the uterus, and keeps it in a state of persistent erection and high vascularity, with the normal phenomena attendant thereupon."

It is evident that this form of bladder trouble can only be relieved by treatment of the ovarian disease, for which bromide of potassium and counter-irritation are very serviceable, with, of course, attention to the general health.

Symptomatology.—In all of these nervous affections of the urinary organs, pain and a feeling of weight and uneasiness in the region of the bladder are usually present. Still, the most constant and distressing symptom is the frequent and painful desire to micturate, which the patient tries to relieve by frequent urination, a few drops only being passed at a time. Of course, there are varying grades of this affection, in some of which these symptoms are by no means so troublesome. In some extreme cases, when a little urine collects in the bladder, the pain and irritability are so intense that it is spurted out by a very forcible and painful contraction of the organ. The sense of weight and bearing down are most intense in the upright position. The pains may be confined to the neck or base of the bladder, or they may shoot in all directions. The pain in micturition may be present at the beginning, but is usually most severe during and after the completion of the act.

The local pain and distress, with the frequent urination and unrest, react upon the general nervous system, thereby greatly aggravating the original disorder. This lowered systemic condition in turn affects the local disorder, and so the one is continually aggravating the other. In this way the patient, if not relieved, goes on from bad to worse, until the host of phenomena characteristic of nervous prostration and general ill-health are developed.

In certain cases the sufferers are by no means so badly circumstanced, but time and neglect tend to produce these results sooner or later. In some cases, again, the suffering gradually disappears, and the patient is restored to health without much aid from treatment. The trouble appears to wear itself out.

Diagnosis.—The symptoms I have given are by no means pathognomonic of these affections, the same being produced by organic disease of the bladder, calculi, and various other causes. The diagnosis must be made by exclusion. The first thing to do is to make a careful microscopical and chemical analysis of the urine. Not only can local organic trouble be thus eliminated, but important knowledge as to the state of the general system obtained.

If no urinary abnormality is discovered, a careful external and internal examination of the organ itself should be made. A finger should first be passed into the vagina, and an endeavor made to ascertain, by pressure on the vesico-vaginal septum, whether there is any abnormal sensitiveness of the vesical base or neck, or of both. Then the sensibility of the mucous membrane should be tested by the introduction of a sound.

If sufficient cause be not found in either the urine or the bladder, the case may be set down as one of pure neurosis, to be treated as I shall hereafter describe. Systemic conditions, such as hysteria or chlorosis, should be considered, as they point to a tendency to neurotic difficulties, liable to be localized.

Prognosis.—As a rule, the prognosis is favorable. This, however, is not always the case. The longer the affection has lasted, the more difficult it is to cure. Most cases may be cured in a few weeks' time, and even the most obstinate in a few months. The danger to the patient lies in the fact that continuance of the disorder is liable to bring on an organic lesion, and, whether this results or not, the reaction on the general system tends, in the worst cases, to produce hypochondriasis or even melancholia.

Causation.—These nervous affections of the bladder occur most frequently in those of the nervous temperament. A highly developed nervous system predisposes one to nervous affections of all kinds. Especially is this the case if the subject is not well sustained by a vigorous nutritive system. Those in whom the emotional elements predominate in the mental composition are more liable to nervous affections of the bladder than those of the more intellectual type.

The exciting causes include all influences which depress or exhaust the nervous system. Mental taxation or excitement which tends to increase the excitability of the nervous system may derange the function of the bladder. Constitutional diseases which lower the tone of the whole organization also tend to produce the affections now under discussion.

It is not possible to give any satisfactory explanation of the reason why the innervation of the bladder becomes deranged in some persons from causes which are in others inoperative. It may be that those who are most susceptible to this cause are so because of some inherited sensitiveness of the pelvic organs which responds to the disturbing influences. This appears to be the case with those who suffer from irritation of the bladder caused by ovarian disease. This is apparent from the fact that one affected with disease of the ovaries will suffer from derangement of the function of the stomach, while another having a similar ovarian affection will suffer most from frequent urination.

Regarding the causative relations of malaria to irritation of the bladder, all that can be said at the present time is that this *materies morbi* appears to act upon that viscus through the nervous system.

Treatment.—This may be classed as general and local. In pure neuroses, attention should be first directed to improving the general condition of the patient. Cheerful company should be provided at meals and at other times, and there should be exercise suited to the strength of the patient, daily ablution, and proper regulation of diet. This latter should be simple and nourishing, and of a kind calculated to produce as little urea and urinary solids as possible. In cases where the urine is limpid, the opposite course is to be pursued. Pastry, irritating condiments, and stimulants, except in rare cases, should be prohibited. The exception to this is where a condition of the system calling for stimulation exists. In such cases the irritation of the bladder produced by their use may be more than counterbalanced by the good they do the general system. Tea is better than coffee, but neither is to be used in any great quantity.

The condition of the urinary secretion must be carefully watched, and any abnormality quickly and judiciously corrected. Where there is any tendency to excessive acidity, the effervescing waters, rich in carbonic-acid gas, will be found of use.

The bowels should be kept moderately well open, but should never be irritated with active cathartic agents.

Tonics and medicinal stimulants are often of great value when judiciously exhibited. Strychnia in very small doses does not, as might be supposed, aggravate the irritable condition of these organs. The nerve-tone being below par, strychnia, by gradually increasing it, is of great service. In large doses it is undoubtedly hurtful, and should never be long continued. Quinine, iron, and the various simple and compound vegetable bitters act well in the cases where their exhibition is indicated.

If the irritation is extreme, various soothing emulsions and decoctions may be given by the mouth. Of these, preparations of marshmallow, triticum repens, acacia, pareira brava, and buchu act well. Emulsio-amygdalæ is much used and highly recommended by the German authors.

Some objections have been raised to the use of these drugs on the score that they increase the flow of urine, thus aggravating the local irritability. The fact is, however, that the presence of fairly normal urine in the bladder in moderate quantity seems to relieve rather than increase its irritable condition.

The local treatment may be as follows: A cupful of warm hop-tea, containing from twenty to forty drops of laudanum, may be injected into the rectum. Suppositories containing opium may often be used with benefit. With the opium or morphine in the suppositories may be combined belladonna, atropine, or hyoscyamus. Morphine in the form of Magendie's solution may be injected directly into the bladder. There seems to be no especial advantage in this mode of administering anodynes, hypodermic injections of the drug acting as well, if not better. Emulsions, decoctions, and infusions of cannabis Indica, hyoscyamus, belladonna, and other like drugs may be used by the mouth, as the case may require.

Good effects have followed the use of rectal injections containing chloral hydrate (grains 15 to water ℥i or ℥ij). It may also be given by the mouth, but does not usually act so quickly or have such a direct local effect.

The injection into the bladder of a solution containing morphine, followed by cauterization of the mucous membrane, is highly spoken of by Braxton Hicks. He claims in this way to deaden the reflex irritability of the membrane.

I must insist on this—that opium shall be used in such cases with great care, and never continued long. If this rule is neglected, it will lead many nervous patients to contract the opium-habit, which disease is worse than irritable bladder.

Debout recommends the use of bromide of potassium by the mouth, and also in suppository, combining with it in the latter tincture of opium and belladonna. I prefer hydrobromic acid to the bromide of potassium.

When the trouble is due to masturbation, moral and mental influences must be brought to bear, as well as medication and regulation of diet and habits. In these cases the bromides will be of service.

If all other treatment fails to accomplish the desired result, resort should be had to mechanical means, viz., the rapid and forcible dilatation of the urethra. Some authors, indeed, think so highly of this method that they boldly assert that time spent in medication is time lost. Astonishing and very gratifying results have certainly followed its use in a number of cases. Hewetson reports in the "Lancet" (page 4, vol. xii, 1875) that in this manner he cured a case of cysto-spasm of fifteen years' duration. This procedure is spoken of in the highest terms by Teale ("Lancet," page 27, vol. xi, 1875), as also by Spiegleberg, Tillaux, and others. In the cases where this treatment gives relief, I believe that there is some inflammatory condition present, or at least something more than a neurosis.

When due to malaria, the treatment is usually simple and satisfactory. Quinine in full doses, as recommended by Bricheleau ("Arch. gén. de mèd."), for one day, and then in small doses before meals for a week, will usually cut the trouble short, and prevent its return. The digestive organs require attention when they are out of order, as they usually are.

If due to hysteria, the original disease should be treated, not, however, neglecting the local trouble. When accompanying acute or chronic systemic diseases, it is only relieved when the original disease is cured, although in the mean time the annoyance may be greatly alleviated by the treatment already recommended.

ILLUSTRATIVE CASES OF FUNCTIONAL DISEASES OF THE BLADDER, IN WHICH THERE IS NO RECOGNIZABLE ORGANIC LESION.

Neuralgia of the Urethra and Neck of the Bladder.—A married lady, who had never been pregnant, was first seen when she was twenty-six years of age; she had then been three years married. She was well developed, and, although of a marked nervous temperament, had always enjoyed good health. From puberty onward she had suffered pain at her menstrual periods, but not of severe character. When she was twenty-four years old she was chilled while riding a long distance on a cold day, which was followed by frequent and painful urination. This was somewhat relieved by rest and diuretics. From that time she was subject to violent attacks of spasmodic pain in the urethra and bladder. The pain was of a sharp, lancinating character, generally coming on before and after her menstrual period; it was, however, brought on at any time by nervous excitement or great fatigue. During the pain there was some difficulty in urinating, but the pain was neither relieved nor increased by the act. The duration of the pain varied, but usually did not last more than twenty-four hours. At times she became almost frantic, so great was the suffering. Large doses of opium would relieve her, but, as it caused very distressing after-effects, she avoided taking it, except when the attacks were exceptionally severe and prolonged. When she first came under my care she had a flexion of the uterus, with slight general tenderness of the pelvic organs, which accounted for her mild dysmenorrhœa, and I presumed that that might be the cause of the neuralgic pains in the bladder and urethra. She was treated for the uterine affection, and obtained complete relief from the painful menstruation and tenderness of the pelvic organs generally, but no relief was obtained from the periodic attacks of pain in the urethra and bladder. She acknowledged that it was not quite so severe at her menstrual periods, but was "bad enough in all conscience," as she expressed it.

Careful and repeated examinations of the urine were made when she had pain, and when she was free from it, but no trace of any renal, vesical, or urethral disease was obtained. The urethra and neck of the bladder were examined with the endoscope several times, but were found to be normal. Suspecting that the neuralgic pain—for such it apparently was—might be due to malaria, she was given fifteen grains of quinine within a period of eight hours, followed by Fowler's solution of arsenic in doses of three minims after each meal. The arsenic treatment was continued for several weeks, and gave her some relief, the attacks being less violent, but still she suffered greatly.

Moderate dilatation of the urethra was then practiced. This aggravated the trouble. Several different remedial agents, including opium, hot water, aconite, infusion of hops and belladonna, were injected into the bladder, but none of them gave any relief. The citrate of iron and quinia in five-grain-doses was then prescribed to be taken before meals, and Parrish's compound sirup of the phosphates in drachm doses to be taken after meals. When the pain came on she was directed to take every three hours a drachm of camphor-water containing eight grains of muriate of ammonia, and to use a vaginal douche of hot water. This treatment usually resulted in mitigating the pain, but did not completely abolish it. Thirty minims of the compound spirits of ether and five minims of the tincture of cannabis Indica every four hours were substituted for the camphor-water and muriate of ammonia and with good effect. Under this treatment her attacks were far less frequent, and the relief from pain was prompt. She was so much pleased with her improvement that she took a trip through the West and returned quite well, and has remained so for the past eight years. More recently I have had a case which resembled this one in many respects, particularly as regards the character of the pain and its causation, in which a four-per-cent solution of muriate of cocaine instilled into the urethra and bladder gave relief.

A Peculiar Form of Neuralgia not yet described, excited by a Desire to Pass Water and by Micturition. (By Dr. Putegnat, of Luneville. (Gaz. Hebdom de mèd. et chirurg., April 15, 1864.)—The following two cases, out of six published by the author, will give an idea of this peculiar neuralgia, which consists on the one hand, in a special sensation in the bladder, and on the other, in symptoms of a neurosis of the ulnar nerve.

M. X., aged fifty, with chestnut hair, of a nervous and sanguine temperament, very abstemious, in affluent circumstances, leading a very active life, occupying very healthy apartments, free from all diathesis, except a slight rheumatic affection, liable to coryza in cold, damp weather, has never had any other nervous complaint beyond headache and occasional gastralgia after eating dressed salads or raw fruit.

From time to time, at varying intervals of weeks, months, and even years, without any apparent physical or moral cause, in all electric, barometric, and thermometric conditions of the atmosphere, as soon as his bladder is full, and he has a strong desire to pass water, he feels along the urinary passages, especially in the perinæum a peculiar sensation of numbness, not very painful, but acute, burning, lancinating, and unpleasant from the accompanying sense of prostration. This strange sensation next affects the shoulders, comes down both arms, along the course of the ulnar nerve only, and gives rise in the forearm, the little and the ring fingers, to the same sensation as when the ulnar nerve is strongly compressed at the elbow. The pain is more acute on the left than on the right side, lasts about twenty or thirty seconds, and after diminishing gradually, disappears without leaving any trace behind it.

M. X., of Luneville; living in healthy rooms; very active, easily moved and excited; subject to headaches and to rheumatic pains; free from any diathesis; very abstemious; complains, for several successive days, but at irregular intervals, and without any known cause, of a strange sensation along the outer border of the left forearm, on the inner side of the thumb, and the outer surface of the index-finger especially. This sensation he compares to the one produced in the last two fingers of the hand by compression of the ulnar nerve at the elbow.

The painful sensation only comes on whenever he has a strong desire to pass water, persists during micturition, and ceases completely immediately afterward.

On analyzing the six cases of the author, we find four of them to have occurred in females. The mean age of the patients is forty-six; the oldest being fifty-two, and the youngest thirty-six years old. They are all in easy circumstances; five occupy healthy apartments, the sixth only living in damp rooms on the ground floor. Three patients have had gastralgia; the fourth sciatica, and great troubles have shaken his nervous system; the fifth is subject to violent headaches; and the sixth, a female, seems to have epileptiform seizures, and has a double neuralgia. From the above, then, it may be concluded that neuralgia and great nervous excitability are predisposing causes of this strange neuralgic affection.

In one of the four female patients the catamenia had ceased; in three they had not, and in two of these the neuralgia showed itself before and during the menstrual periods. Uterine congestion seems then to be a predisposing cause also.

Four of the six patients had had rheumatic pains; but the other two having never suffered from such pains, this can not be considered as the exciting cause of the neuralgic affection.

The desire to pass water, and especially the act of micturition, brings on the sensation, which only appears at those stated times, and it reaches its maximum intensity at the beginning of the micturition. It has all the characters of neuralgia, and can even aggravate, as in one case, an already pre-existing neuralgia—that of the median nerve.

As to the precise seat of the sensations, we find them affecting the four extremities of one patient, but the upper limbs only of the remaining five. In three cases they simulate to perfection neuralgia of the ulnar; and in two they are felt in the tips of all the fingers. In one case they coincide with and intensify pains in the course of the median ; and lastly, as in the first case we have given above they are felt in the distribution of the left radial nerve.

The first patient complains of pain in both shoulders, especially the left; the fourth, of pain in both arms and hands, but chiefly in both breasts, and in the left breast more than the right; the sixth, again, of pain in both forearms and hands, but more marked on the left side. Hence, the left side of the body would seem to be either the only one affected, or the one most affected.

The patients always distinguished clearly the special painful sensations felt in the urinary passages from the normal sensations due to a distention of the bladder and the subsequent desire to pass water.

Retention of Urine Due to Hysteria.—A single lady, thirty-one years of age, of delicate organization and pronounced nervous temperament, yet very quiet and self possessed in manner, suffered for some time with difficulty of urination. At times she could urinate very well, at others she was obliged to try repeatedly before she succeeded. She was a lady of high culture and liberal education, but was not interestedly occupied, and hence she had much time for introspection.

She called her physician who prescribed remedies, but finding that they did not give her relief, made an examination of the pelvic organs but could find no cause for her inability to urinate with facility.

Soon after she was taken with complete retention which was relieved by the catheter. This continued for weeks, requiring the doctor to visit her three times a day, and occasionally at night, to pass the catheter. For some reason which was not very evident and could hardly be due to weakness or suffering, she remained in bed most of the period during which the catheter was used. Becoming weary of such close attention, the doctor tried letting her wait, to see if a full distention of the bladder would have any good effect. This caused her so much pain that the doctor felt somewhat mortified at his want of feeling in permitting her to suffer. During this time he had tried a number of remedies, but without effect. At this stage of the history I was called in consultation; I could find no evidence of any organic disease, local or general. The urine was found upon examination to be normal. I suggested to the attending physician that the trouble was hysteria, but he assured me that she was singularly free from all evidences of that affection. Indeed, he had found her a remarkably calm and sensible lady, and very free from nervousness of every kind. The impression that I received was that there was a very decided hysterical element in the case, and I advised full doses of bromide of potassium and a sitz-bath when she desired to urinate. I also recommended that she should go to Saratoga, and drink Hathorn water. She did this, and the water gave her diarrhœa, and her retention was immediately relieved.

Frequent Urination Due to Hysteria.—A lady twenty-three years of age, in very good general health, and living in very easy circumstances, had some disappointment which caused her much distress. She had faintings of a mild character which alarmed her mother and called forth much sympathy. About this time she began to suffer from frequent urination. This did not yield to the treatment employed by the family physician, and she was brought to my office for advice. Her health was at times excellent, but she was greatly annoyed by this frequent urination. The urine was normal except at times when it was of a very light color. She could sleep all night without being disturbed by a desire to urinate. If by chance she did not go to sleep immediately on retiring she was obliged to urinate every few minutes, and if she was awakened in the night she had to urinate many times before she could sleep again.

Any little mental excitement, such as going to church or to the theatre, would bring on the trouble, so that she had to give up all public duties and pleasures. Systematic exercise and occupation, cold baths, bromide of sodium, and a full assurance on my part that she would soon recover, helped her greatly. She was commanded in a very decided way to resist the inclination to such frequent urination, and she obeyed orders.

Soon after this her attention was attracted in another and more interesting direction, and she recovered completely.

Frequent Urination from Perverted Sexual Function.—A girl nineteen years of age who had a good general organization and enjoyed good health up to puberty at fourteen, sought advice regarding impatience of her bladder. She was obliged to return home from boarding-school because she had to urinate so often that she could not attend to her studies and recitations. Her general nutrition was good, she menstruated regularly, freely, and without acute pain. Her nervous system was depressed. She was sometimes languid, low spirited and fretful, at other times she was bright and disposed to be cheerful. Her manner was rather timid and excited. Her hands were clammy, and her eyes dull, and had dark streaks under them. Her chief symptom was the frequent urination which persisted but was much worse at times than at others. Occasionally she would pass the night without getting up more than once or twice, but during the day she was often obliged to urinate every half-hour. There was very little pain except occasionally a little smarting at the meatus. She complained of heat and burning about the vulva and occasional aching in the region of the ovaries. She was easily fatigued and had backache, especially on standing and walking—leucorrhœa troubled her only at times.

I suspected at first that she had either cystic and urethral congestion, or else hysteria giving rise to excessive renal secretion of limpid urine, but an examination of the quantity and composition of the urine proved the contrary. She was put in charge of a very competent nurse who was directed to find out the habits of the patient.

The report of the attendant was that she had begun to indulge in masturbation soon after puberty, and that the habit had gradually grown upon her. Her nurse surprised her by telling her the cause of her suffering, and readily gained her consent to make all due efforts to recover her self-control. By care, occupation, and exercise out-of-doors, and the moral control of her nurse, she began to improve. Bromide of sodium was given when she was very restless and irritable, but no other medication, except the free use of bathing.

In about two months the frequent urination had disappeared, although she would occasionally have a day or a night when she suffered in that way a little. She now has two children, and enjoys life very well, being free from her former symptoms and no doubt cured of her former habit.

Frequent and Difficult Urination from Sexual Continence.—The patient, a strong and active lady in good circumstances, was married at twenty-one years of age, and had her first baby before she was twenty-two. She nursed the child for eighteen months. Her menses came on when the child was one year old. About three years after her marriage, her husband, a strong, vigorous man, died of pneumonia. Several months after the loss of her husband she began to suffer at times from frequent urination, and also had some difficulty in voiding the urine, requiring voluntary efforts. These attacks would pass off, and she would be comfortable for days, when the same irritation of the bladder would return. She was always made worse by excitement, often being kept awake nearly all night after spending the evening in company.

Her symptoms became so troublesome that she sought advice of a physician, who treated her for cystitis by giving medicines of various kinds. When she first came under my observation I found her in perfect health in every way. The urine was normal, and caused no pain when she passed it. I was easily able to exclude all diseases except deranged innervation from a possible malarial influence. The periodical character of the attacks favored this view of the case, but the use of the anti-malarial remedies gave no relief. I then ordered her to take more active exercise and a limited quantity of plain food, to bathe frequently, and to avoid excitement as far as possible. Bromide of sodium was also given when her suffering was most severe. She improved on this treatment for a time, in fact she became so much better that I lost sight of her for nearly a year. She returned to say that her former symptoms had returned, and were about as troublesome as before. The same treatment was employed but did not help her very much. She was now rather nervous and restless, and disposed to be emotional.

Three months afterward she was married, and left the city on an extended wedding-tour. Upon her return she reported herself as perfectly well.

A Case of Malarial Irritation of the Bladder in the Female. (By Henry K. Leake, M. D., Dallas, Texas. Abstract of a paper read before the Texas State Medical Association.) I desire to record an observation, which I have recently made, exemplifying the effect that the malarial poison may exert upon the female bladder; an observation which may appear commonplace since, as is well known, it has not escaped mention by Prof. Skene in his excellent work on the "Diseases of the Bladder and Urethra in the Female" as well as by other authors of equal or less prominence, who have attended to the same subject.

Nevertheless, considering the mere allusions by these writers to irritation of the bladder in women, which may be caused by the presence of malaria in the system, on account, doubtless, of the rare occurrence of this affection, it may be questioned whether the latter has been sufficiently individualized as a distinct and independent malady, deserving especial prominence in the nosology of diseases of the bladder, which seriously disturb the functions of this sensitive viscus. There is the additional reason, also, for reporting the experience which I have had of this peculiar and interesting disorder, in the fact that much obscurity yet surrounds the entire subject of disturbance of the functions of this organ in the female, the integrity of which is so vital to the comfort, happiness, and safety of the individual.

Moreover, such conditions often tax the diagnostic acumen of the physician to the utmost, and even when by the exclusive method, rigorously employed, many causes of irritation of the bladder may be eliminated from the problem in hand, there will yet remain in particular cases, other causes which may elude discovery, thus obscuring the pathogeny and defeating every measure of treatment which is attempted.

About March 1st, of the present year, a lady, whose health has been uninterruptedly good, thirty-seven years of age, the mother of six children, the last of which being an infant of four months, applied to me for treatment for what she considered the ailment to be, incontinence of urine. She stated that the condition had come on gradually, at the first amounting to a mere frequency of urination during the day, without any attendant pain or other symptom which attracted her attention. This frequency had increased, however, to such an extent as to seriously embarrass her in the performance of domestic duties, and prevent her from visiting friends, or doing necessary shopping. Moreover, she soon became troubled at night, often rising six or, perhaps, a dozen times, in obedience to the urgent calls for micturition. The amount of urine passed at each discharge was not large, but exceeded in quantity that ordinarily retained in cases of acute cystitis, which the affection in many respects closely resembled.

There were no deposits in the urine worth noting. It appeared to be somewhat higher colored than normal. There was also a superabundance of mucus, in the form of large flocculi, but no pus or blood.

As the case progressed, the desire to evacute the bladder was preceded by a sharp twinge of pain, which the patient averred was "low down at the very neck of the bladder," but which was immediately relieved on emptying the viscus. There was no tenderness at any point except a slight pain experienced when the neck of the bladder was firmly pressed toward the pelvis.

The frequency of micturition increased to almost constant dribbling from the bladder, both daily and nocturnally the cloud of mucus in the urine was much augmented, and while the color appeared to remain unchanged, there was evidently a large excretion of solid matter composed probably of phosphates.

The uneasiness elicited at the neck of the bladder by pressure on this part soon changed to actual soreness. At the end of the second week the case had passed into one of apparently serious import, and was operating with telling effect on the vitality and mental equipoise of the patient.

The tripod of treatment, namely, rest, opium, and alkalies, upon which Van Buren and Keyes cogently protest the successful management of cystitis rest, was relied on to relieve what I now feared was a case of this distressing disease, the cause of which I could not then determine. The constitutional effect of belladonna was evoked also to mitigate the symptoms, and finally hot-water vaginal injections were employed for their well-known analgesic and antiphlogistic effects upon the pelvic viscera.

Such measures gave only temporary relief, the features of the case resuming their original character whenever the effect of medication—which was occasionally suspended to ascertain the *status quo* of the disease—had passed off.

At the beginning of the third week from the first appearance of the symptoms, the patient complained of slight chilliness toward evening, and it was observed that this was followed by fever, the thermometer in the mouth registering 101.° These symptoms were interpreted to indicate the constitutional expression of the local inflammation existing in the bladder. Hence, no special attention was directed toward them. The chilliness was repeated, however, on the third evening, and on the fourth day at the same hour reappeared as the prodrome of a marked rigor, followed by an abrupt rise of temperature of 103° succeeded by sweating and a return to the normal temperature in about four hours, thus clearly demonstrating a well-defined periodicity of the febrile movement.

Suspicion being now aroused as to the essential nature of the case, the patient was promptly placed on ten-grain doses of the sulphate of quinine, to be taken every four hours with mercurial and saline purgatives, the latter being indicated by the appearance of the tongue and the confined state of the bowels, which was due not altogether to the opium administered, since this physical modifier had been exhibited both freely and simultaneously.

The substitution of the quinine for the treatment previously pursued, like the fabled wand of the magician, broke the spell of enchantment, which, by its subtle and potent influence had held the patient with relentless grasp for three weeks and had transformed a hopeful and contented disposition into one of melancholy and apprehension.

At the end of four days from the administration of the first dose of quinine the patient was virtually convalescent. During this period no opiate was employed nor any other medicine but quinine taken, save an occasional dose of neutral mixture, chiefly for its sudorific effect. Nevertheless the irritation of the bladder did not return, and the close of the week found the patient, although debilitated by the trying ordeal through which she had passed, enabled to resume her accustomed duties.

Periodical Attacks of Frequent and Painful Urination and Vesical Tenesmus caused by Malaria.—About two years ago a patient came to my college clinic complaining as follows: In the afternoon of each day she experienced a sense of heat and burning in the bladder and urethra, with a frequent and irresistible desire to urinate. Evacuation of the bladder, attended with a great deal of smarting and pain in the urethra, did not give complete relief but left some vesical tenesmus which increased in severity as the bladder became distended. These symptoms persisted during the night and kept her awake, but toward morning her sufferings entirely left her, and she became quite comfortable until the next afternoon. This condition had existed for nearly two months, and accordingly her digestion became impaired and her strength diminished. This was attributed by her to the want of sleep, and no doubt in part was due to this cause. The urine was examined, and found to be normal except that it contained a slight excess of phosphates. She was carefully examined, and no evidence of organic disease was found. While she always enjoyed full health and had been a vigorous woman, she had had an attack of malarial fever about six months before I saw her, and about the time this bladder trouble came on she said she had symptoms of her former ague. From the facts in her history I ventured to state to my class that this was a functional derangement of the bladder and urethra caused by malaria, which would promptly yield to judicious doses of quinine. I accordingly prescribed twenty grains of quinine to be taken between early morning and noon, to be followed by two-grain doses before meals with four drops of Fowler's solution of arsenic after meals. She was ordered to report at the clinic the following week. She did so, and declared that she had been perfectly well since the first day she took the medicine. The quinine and arsenic in small doses were continued for three weeks, at the end of which time she reported herself as having been well and free from all irritation of the urinary organs.

No change in the character of the urine could have occurred to produce such marked periodicity in the functional derangement of the bladder and urethra; moreover, the urine was found to be normal, and she completely recovered on the use of quinine.

Vesical Tenesmus and Frequent Urination due to Prolapsus and Inflammation of the Ovaries.—In prolapsus of the ovaries and inflammatory affections of these organs irritation of the bladder often occurs. This is illustrated by the following case:

A young girl of twenty-one was brought to me suffering from great distress in the pelvis, which was much aggravated by standing or walking. Her suffering was constant, but was tolerable when she remained in the recumbent position. She began to complain about six months before I saw her, and about the same time she found that she was obliged to urinate too often, and that there was an uneasy feeling in the bladder most of the time, a feeling as if the bladder had not been fully evacuated.

She was much worse at her menstrual periods. Upon a thorough examination I found both ovaries prolapsed, slightly enlarged, and exceeding tender. In every other respect she was perfectly well. In consultation with her physician, a course of treatment for the ovarian disease was decided upon. This was fully and faithfully tried for over one year, but at the end of that time she was worse.

She was then quite impatient, being very nervous and irritable from her confinement and suffering. Her parents and friends were quite weary of seeing her suffer. Her bladder irritation was no better; in fact it was a great source of suffering. She could not urinate without getting up, and the erect position increased her ovarian pain. The ovaries were still prolapsed and just as tender, in fact, more so than they had been.

The complete failure of treatment so far indicated that removal of the ovaries was the only thing that promised to give her relief. Accordingly the ovaries were removed, and she made a rapid recovery from the operation and was completely relieved not only from her ovarian pain but also from the frequent urination and vesical tenesmus.

It should be stated that at no time was there any evidence of cystitis found upon frequent and careful examinations.

CHAPTER XL.

FUNCTIONAL DISEASES OF THE BLADDER (CONTINUED).

Having considered the vesical derangements in which there is no recognizable organic lesion, and which may be local neuroses, or may be due to hysteria, disorder of the sexual function, malarial or ovarian affections, I will now invite attention to the second class of these disorders.

I. Derangements of function due to diseases of the nutritive and nervous systems, or to abnormal conditions of the urine which result therefrom.

This class naturally subdivides itself into:

1. Derangements occurring in both acute and chronic diseases.
2. Derangements due to consequent abnormal conditions of the urine.

1. Of the derangements which occur in the course of acute diseases, such as retention and incontinence of urine and frequent urination, nothing more than the mere mention is necessary. They rarely require any treatment, except possibly in the case of retention, when catheterization is to be employed, and they cease as soon as the acute stage is passed. Those, however, which are due to chronic affections of the nutritive and nervous systems are more permanent, and often tax the resources of the physician to the utmost. The two most important are:

(*a*) Paralysis of the bladder, and,

(*b*) Incontinence of urine.

(*a*) **Paralysis of the Bladder.**—This affection has also been described under the names of weakness or palsy of the bladder, and vesical atony. It occurs in two forms: First, from causes residing in the organ itself; second, from those due to outside influences. As affections in the first form will be fully described in another place I shall here simply mention them. They are: Fatty degeneration and atrophy of the muscular walls of the bladder, a common cause of paralysis of this viscus in old women; overstrain of the muscular structure from prolonged retention, voluntary or involuntary; displacements and inflammations of neighboring organs affecting its position or nutrition; and abdominal and pelvic tumors.

In fevers of a serious type the power of nerve conduction may be either lost or impaired, and a partial or total vesical paralysis result, with overdistention and dribbling of urine.

The second form is due to influences acting from without the bladder, and includes acute and chronic meningitis; apoplexies of the brain or spinal cord; sopor; delirium; myelitis of the lower part of the spinal cord; inflammation of any kind primarily affecting or involving in its results either the lumbar nerves or ganglia; endarteritis deformans of the pelvic arteries; lumbar or renal abscesses; blows or fall upon the loins, supra-pubic region, or head; shock or disease of the vesical or lumbar nerves from the prolonged use of opium or poisoning by it, and also shock due to overdistention of the organ itself.

Symptomatology.—Except in cases of injury of the brain and apoplexies, the invasion of the disease is usually very gradual. This is especially the case in the aged, and sometimes, though rarely, in young people. The patient first observes that the urine is expelled from the bladder with less force than usual; that the act of emptying the bladder is more slowly accomplished, and that after a time the organ is unable to expel its contents without considerable straining and aid from the abdominal muscles. At a later date, if the disease goes on unchecked, the stream is less and less forcibly ejected, intermits, and the bladder, after much straining, is but partially emptied. Finally, partial or complete retention follows.

The female bladder seems to be capable of more distention than that of the male. Lieven, in a case of supposed ovarian tumor, removed by catheterization about nine pints of urine. The patient was a woman thirty-three years of age. The fundus of the bladder reached as high as the ensiform cartilage. I once saw a case exactly like this, except that the bladder only reached to about two inches above the umbilicus. More than a gallon has been drawn off by Hofmeier and others.

A peculiarly interesting experiment bearing upon the dilatability of the bladder was made by Budge. He found that section of the lower part of the spinal cord, when the bladder was considerably distended, allowed increased reflex action of the sphincter, and enormous distention then took place—even more than could be produced by force, after death. This is especially interesting in relation to vesical paralysis and retention due to injury or disease of the lumbar portion of the spinal cord.

In some cases of overdistention the resistance of the sphincter is overcome somewhat, and a constant dribbling of urine takes place. It has been called by some authors incontinentia parodoxa. These cases are liable to be mistaken for those of pure incontinence.

In rare cases rupture of the bladder may take place; more commonly dilatation of the ureters and hydronephrosis. If the condition of vesical distention be not soon relieved, vesical catarrh, true inflammation, ulceration, and death take place. In cases due to injury or disease of the spinal cord, low down, there seems to be a paralysis or peculiar condition of the nerves presiding over the nutrition of the vesical mucous membrane, and destructive changes are not uncommon.

Diagnosis.—The diagnosis though easy, is sometimes not made, owing to careless observation or ignorance. When called to a case where there is supposed distention of the bladder, the abdomen should first be examined to see if there are signs of a tumor, and then a catheter should be passed if that be possible, to determine whether an abnormal amount of urine is present. If this is the case, and the tumor gradually subsides as the urine flows, the diagnosis is at once made. When, however, a catheter can not be passed into the viscus, fluctuation should be sought both through the vagina and on the surface of the tumor. If the diagnosis be still obscure, the aspirator-needle should be passed into the tumor, and its fluid contents carefully tested. The age of the patient, the duration of the disease, and its time and method of invasion will aid in settling the question. The trouble may, however, occur at almost any age, and the fact that a little urine has been passed at short intervals will tend to deceive.

In the early stages of the disease an idea can be gained as to its progress by carefully noting the amount of urine passed at each micturition, the amount passed in twenty-four hours, the length of intervals between urination, the force of the stream, whether the bladder is fully or but partially emptied, and whether the stream intermits. The urine should be examined often, else cystitis may get a firm foothold before its existence is recognized. In drawing off the urine for testing or other purposes, the catheter should be *absolutely* clean.

Incontinentia paradoxa must be differentiated from incontinence due to mechanical causes, such as abnormal urine, or the pressure of neighboring organs upon the bladder.

Prognosis.—If the disease be uncomplicated the prognosis is good. Paralysis of the organ accompanying the fevers, dysentery, peritonitis, and the like, usually disappears with the cure of the original disease.

If the paralysis be accompanied by disease of the bladder-walls, or if it occurs in weak, debilitated constitutions, or has been of long duration, or occurs in old age, the prognosis is not good. A cure, if effected at all, will be only after long and tedious treatment.

When due to centric causes or to serious spinal disease or injury, or when it occurs in old people, or with meningitis, or with systemic trouble, the prognosis is very grave indeed.

Causation.—Deranged innervation due to the central lesion already mentioned, either cerebral or spinal, may be regarded as the principal cause of this affection. If the paralysis has been of long duration nutritive changes may occur in the bladder, but as these will be discussed under the appropriate head I need say nothing of them here.

Treatment.—In all cases where there is fear of vesical distention, the bladder should be emptied at stated intervals. By way of helping the patient to pass water herself, hot hip-baths may be tried and fomentations over the bladder. The sound of water falling from one vessel into another often accomplishes the same result. If these means do not succeed the catheter must be used.

And here attention may be called to a very important practical point in connection with the use of the catheter. When the bladder has become very much distended it can not be thoroughly emptied unless pressure is made upon the abdominal walls; if this pressure is made while the catheter is in the bladder, and then discontinued, air will be drawn through the catheter into the bladder and decomposition of the urine will thus be favored.

Marked distention can usually be relieved by the catheter. In some cases, however, the bladder rises up into the abdomen and puts the urethra upon the stretch, thus changing the direction of its axis from the normal to one from below directly upward, the canal being nearly parallel to the posterior surface of the pubic symphysis. In these cases passing the catheter will tax the skill somewhat. Great care must be used to avoid injuring the urethra.

In emptying a greatly distended bladder a binder should be applied to the abdomen and tightened gradually as the urine flows. It is not safe to draw off all the urine at once. It is better to take away about half, and then after a time to draw off more, until the organ is empty. Syncope and even death, which is said to have occurred in these cases after rapid emptying of the organ, are probably due to the sudden removal of the pressure on the abdominal organs, which so deranges the circulation as to cause these serious results. The sudden removal of pressure from the vesical walls, which that pressure rendered anæmic, now allows intense congestion, and the vesical walls being paralyzed catarrh and cystitis result. Therefore, for many reasons, a distended bladder should be emptied slowly.

When, for any reason, a catheter can not be introduced into the bladder, hot hip-baths should be again tried, and opium given in sufficient amount to relieve pain and any spasmodic action that may exist. If, after this, there is failure to enter the bladder (and it is only in very rare cases that this occurs), recourse should be had to the aspirator, and after having punctured the bladder, the urine should be drawn slowly and carefully, in the manner already described.

In commencing vesical paralysis, and when incontinentia paradoxa exists or has existed, the patient should be taught to use the catheter herself several times daily until the vesical power returns.

It is of the utmost importance that the catheter be *absolutely clean*. After each time that it is used it should be thoroughly rinsed in a chlorine solution, and put away in carbolized oil or vaseline. A great deal of vesical catarrh is undoubtedly lighted up by foul catheters. This is especially the case in hospitals, where the same instrument is often used on a number of patients.

In cases of commencing or established paralysis the effect of the induced electric current may be tried. One pole thoroughly insulated up to the point to be used should be placed in the bladder, and the other over the pubic symphysis and loins, letting the current flow in various directions, through, over, and into, the affected organ. The German authors, especially Winckel, by whom this method is highly recommended in this and like affections, say that the sitting should last but about five minutes.

Forcibly distending the urethra and washing out the bladder with a solution containing salicylic acid has been tried and recommended. I can not see the expediency of this unless vesical catarrh exists; and even then washing must be done gently and carefully, and without previous dilatation of the urethra.

Attention should be paid to the general health. The food should be good and nourishing, and the alimentary canal kept in a proper condition to receive and digest it. Wines (especially champagne), beer, and ale may be of use. I can at least say if stimulants are ever given in diseases of the bladder it should be in cases like these now under consideration. These patients are usually more comfortable in the standing or sitting, than in the prone posture, because then the weight of the abdominal viscera replaces to a certain extent the natural tonicity of the organ. As they are usually worse in winter than in summer it is advisable, if the case is chronic and the patient able to bear transportation and rich enough to meet the expense, to send her to a moderately warm climate during the winter months. This will apply in most of the diseases of the bladder.

If the trouble be purely atonic, camphor or musk may be used internally. Tincture of cantharides, in from five to twenty drop doses, three times a day, has been recommended as a vesical excitant. I can not indorse its use without the caution that besides the tendency to irritate the kidneys and produce congestion and nephritis, it may light up a severe cystitis. In these cases it may produce serious trouble without causing much pain to give warning of the danger, as the paralysis lessens the sensitiveness of the bladder, so that destruction of tissue may occur without producing the usual pain and suffering.

Strychnia has been extensively used in this complaint, and with good results in some cases. Its failure to do good in many instances is undoubtedly due to the fact that it was not given in sufficiently large doses. It may be safely pushed as high as the one-twentieth of a grain three times a day, stopping for a few days if any of its characteristic symptoms appear. It has also been used hypodermically in the neighborhood of the bladder.

Ergot has been found useful in cases where the paralysis was due to exposure to cold, or prolonged retention from any cause. The fresh powder has been recommended, and may be given in doses of from eight to sixteen grains, four or five times daily. It is more pleasant and probably more effective to give its equivalent of the fluid extract. Alliers has used it with decided success in cases of vesical paralysis due to centric troubles, such as apoplexy. He has used as much as forty-five grains in the twenty-four hours. It is highly spoken of also by Roth, Jacksch, and others.

Rutenberg ("Wienner Med. Wochenschrift," 1875, No. 37) has recommended, in cases where there is destruction of muscular tissue or incurable paralysis from any cause, to make an opening into the bladder just above the pubic symphysis, keeping the fistula open, and closing the urethra by operative procedures. The urine can thus be retained, unless the patient bends forward and downward or lies upon her abdomen. A urinal would, of course, be necessary to protect the patient.

I think I should prefer to produce a vesico-vaginal fistula, and adapt an apparatus to receive the urine.

(*b*) **Incontinence of Urine.**—Enuresis nocturna is usually an affection of childhood, but has been known to persist up to the age of thirty years. In some children it is hereditary, the mother having suffered in early years, and all the children born to her being affected in the same way. Of all cases, these are the most difficult to manage. They often persist until puberty, when they recover of themselves. The subjects of this affection are usually of the weak, nervous type, although apparently healthy children have been known to suffer from it, but usually only at intervals.

These cases of incontinence may be divided into two distinct varieties: First, the anæsthetic variety. An excellent example of this class is seen in infants who, up to a certain age, wet the bed and their diapers. In the infant this is not disease; it is simply a good normal example of this condition; the incontinence in severe fevers illustrates the abnormal phase of the same thing. Second, the hyperæsthetic variety, which is really nothing more than irritable bladder. Each variety may exist alone, or both be combined in the one case.

In the first variety the retaining power is defective, the resisting power of the sphincter being insufficient to retain the urine or wake the child. When it is put to bed, it sleeps soundly through the night, and the nerve susceptibility to urine-pressure on the neck of the bladder, being lowered beyond the normal degree, fails to wake the little subject and impress it with the necessity of calling the sphincter muscle into action sufficiently to resist the expulsive power of the bladder-walls. In short, in sound sleep the balance between the resisting power of the sphincter and the contractility of the walls of the bladder is disturbed, and the urine flows away without the child's even dreaming of its unfortunate behavior.

In other forms of this affection the brain takes cognizance of the desire to urinate, but too late to control the act. This is seen in children who awake crying when urination is but just begun or half finished. In this case the fault probably lies in the vesical nerves.

In the second variety there is an irritable condition of the bladder (vesical hyperæsthesia), which renders the expelling power greater than that of resistance or retention, and, while the will and cerebration generally are lost in sleep, the contents of the bladder are unconsciously passed before the subject wakes to resist the act. Closely allied to this is the peculiar affection known as vesical chorea, in which the child while awake, it may be in school, in church, or at play, suddenly experiences the sensation that it is about to make water, but, before it is possible to resist, the urine is forcibly spurted out. There are usually choreic movements of other muscles or groups of muscles. This affection is the most annoying when the little ones are nervous, cross, and fidgety. It may be accompanied by nocturnal enuresis. It is apparently more common in the male than in the female child.

An irritable condition of the bladder may coexist with an anæsthetic condition of the sphincter vesicæ—i. e., the two causes of incontinence may be combined.

Irritable bladder, it should be remembered, may be due to some systemic condition—that is, a simple neurosis or to abnormal urine, or reflex irritation from anal fissure, ascarides in the rectum, fistula in ano, hæmorrhoids, or vulvitis.

Enuresis nocturna is not only a filthy habit, and a source of great annoyance to parents, but, moreover, by keeping the genitals wet and irritable, strongly predisposes to masturbation. Then, too, other serious results may happen. The constant wettings are dangerous, in that they may produce many serious complaints from causing the child to "take cold."

Prognosis.—In some cases the cure is easily and speedily effected; in others, the disease cures itself at or just after puberty; but in a few—a very small percentage—no medical or other means seem to aid the sufferer at all.

Treatment.—That the treatment is not uniformly satisfactory is seen by the number of remedies that have been tried. The proper way—and I can not call attention to this too often—here, as elsewhere, is to find the *cause* producing the disease, if it be discoverable, and it generally is. The treatment will, of course, differ in the two classes, and be greatly modified by diathesis and idiosyncrasy. In anæsthesia, local or general, stimulation is indicated. In hyperæsthesia, irritability should be allayed.

Winckel, Barclay, and Brugleman speak very highly of the use of the syrupus ferri iodidi, the last-named gentleman having by its use cured a girl perfectly of incontinence in the short space of fourteen days. This result was probably due more to the effect of the medicine on the blood and general system than to any specific action on the bladder. The sirup of the iodide may be given in from ten to thirty minim doses three or four times daily, according to the age of the patient.

Although belladonna has been lauded by many as a specific in this disorder, its success is by no means general. The drug is usually given by the mouth in from five to twenty drop doses of the officinal tincture. It would be better to begin with small doses in young children, and gradually increase them; for, although no serious results may come from its exhibition in the routine dose—ten drops—the parents may be greatly alarmed by the peculiar redness of the skin produced in some cases. It is maintained by some medical men that the good effects are not obtained unless the administration be pushed to the appearance of the scarlet rash. There is, I think, no proof of the correctness of this statement.

A combination of belladonna and chloral hydrate has been used and well spoken of. Winckel, however, though using them in certain cases for a long time, and daily increasing the amount of chloral, has had but poor results, and even in those cases where the patients improved the benefit was seldom permanent. These drugs may be given singly or together, in suppository or by the mouth. If given together, they should not be combined until the time when they are administered, lest the chloral lose its power.

Narcotics with tinctura ferri chloridi have been recommended by Campbell Black. Winckel speaks well of five to ten drop doses of tinctura thebaica, to a child from ten to fourteen years of age, just before retiring. According to Sauvage, cold baths and cold douches to the spine at night are of great service.

Dr. Kelp ("Le Mouvement Méd.") reports that he has, on several occasions, drawn attention to the value of subcutaneous injections of the nitrate of strychnia in the treatment of obstinate cases of nocturnal incontinence. He practices the injections in the neighborhood of the sacrum. A single injection of a very small quantity of the drug suffices to arrest the affection for a certain time, and when it reappears the operation can be repeated. His latest paper cites the case of a young woman, eighteen years of age, who had suffered from enuresis every night for several months; it came on after an attack of scarlatina, and persisted in spite of all precautions. The first injection produced a respite of several nights, and the second produced a permanent cure. The patient was a strong, healthy girl, and had never suffered from enuresis previous to the attack of scarlatina.

Such a plan of treatment I regard as useful only when there is deranged innervation, characterized by weakness. It would be difficult to get a child to submit to these injections, and I should in any case, whether child or adult, expect the incontinence to return as soon as the strychnia was discontinued.

In cases where the vesical irritability is due to abnormality of the urine, such as lithiasis, oxaluria, and acidity, these conditions should be corrected in the manner I have already pointed out. If to ascarides, anal fissure, and that class of rectal trouble, when the cause is removed the result will usually disappear also. In irritability the usual soothing and demulcent drinks, such as have been already recommended, should be used. Oil of sandal-wood has acted remarkably well in some of these cases. Bromide of sodium and tincture of nux vomica have been effectual in some cases.

In the anæsthetic variety, where the anæsthesia is more or less marked, special or local and general stimulants should be employed. Narcotics are as hurtful here as they are useful in the hyperæsthetic class. Strychnia by the mouth, in suppository, or hypodermically, often produces good results, as also quinine, whether the presence of malaria is suspected or not. Tonic and astringent injections into the bladder are sometimes of service. In cases of abnormally small bladder, forcibly washing it out, distending the organ a little more each time, is well spoken of. In one such case, where there was irritability, Winckel produced a cure by first injecting a solution of nitrate of silver, and following it with sulphate of morphia. This treatment, however, applies more to the irritable than to the anæsthetic type. The little patients are very hard to operate upon, and, unless great care is exercised, much mischief may be caused by local treatment.

Winckel claims good results from the use of the electric current, applied in the manner I have spoken of under the head of paresis vesicæ.

When the bed-wetting is due to pure carelessness, laziness, fear, or dread of the cold air in rising, in idiots and half-witted children, much may be gained by proper education.

There is a general plan of prophylaxis recommended by common sense, viz., the heartiest meal should be in the middle of the day; but little water should be taken toward evening; the food should be plain and unseasoned; the bowels should be kept regular; no coffee or tea should be allowed; the little patients should be put to bed early, after it is assured that the bladder is first thoroughly emptied; they should lie upon a hard bed, with not too much covering; the air in the room should be maintained fresh and pure; the genitals should be kept clean and dry; no places of amusement should be visited after dark; and they should be awakened occasionally to urinate, especially at about the time the parents are going to bed. When it is discovered that they have wet the bed, they should be awakened, and talked to and reasoned with, if they are able to comprehend what is said and meant. Children should not go to school too early, or stay too long. If the enuresis be due to masturbation, the parents must be cautioned to watch closely, and to use every means in their power to stop it. A child should never be whipped for the offense or misfortune of wetting the bed, unless the incontinence be due to pure laziness.

Owing to the fact that incontinence is an affection of childhood, and occurs but seldom in women, cases will not be given to illustrate what is said in the text on that subject. This omission is made for the additional reason that partial incontinence due to displacements of the bladder and urethra and from other causes will be discussed further on.

ILLUSTRATIVE CASES.

Paralysis of the Bladder followed by Incontinence in Case of Insanity.—This was a single lady, twenty-eight years of age, who had been insane for eight months. I was told that at first she was violent, but had become quiet and rather demented toward the time that I saw her. Her physician had observed for some time that her bowels were obstinately constipated, and the nurse noticed that she had great difficulty in evacuating the bladder. She also appeared to have some discomfort in that region; finally, she went for over twenty-four hours without urinating, and then I was called to see her. I found the bladder greatly distended, and yet I could not see that she had pain or tenderness on that account. The catheter was used, and three and a half pints of urine were removed. After this the catheter had to be used twice in twenty-four hours for five weeks. During this time the usual means were tried to restore the function of the bladder, but without effect. The urine then began to flow constantly. When I heard of this, I presumed that the bladder had become overdistended, and that the nurse who used the catheter had not emptied the bladder. This I found was not the case; the bladder was empty. The incontinence continued until the patient died of general paralysis.

Paralysis of the Bladder from Cerebro-spinal Meningitis.—A girl twelve years old was taken with cerebro-spinal meningitis, and presented the usual clinical history of that affection until the seventh day of the disease, at which time the pain had subsided to a great extent, but her mind, which up to this time had been clear, began to wander. Retention of the urine was noticed by her nurse, who called my attention to the fact. I found the bladder distended, but not greatly so. She was asked if she did not desire to urinate, but she answered in the negative, so far as I could understand her. The catheter was used, and, although the distention was not great, the bladder did not contract well, so that abdominal pressure was necessary to make the urine flow through the catheter. The use of the catheter was necessary for some time, during which she improved in her general condition, the mind becoming quite clear. She then began to express at times a desire to urinate, but could not relieve herself. Four days later she succeeded in urinating, but did not completely empty the bladder. She gradually improved, but the catheter was passed once every twenty-four hours for a week longer. The desire to empty the bladder became more and more urgent, and she had pain in the urethra in urinating. An examination of the urine at this time showed that she had cystitis, due, I believe, to the use of the catheter. The cystitis was treated according to my usual methods, and she made a good recovery.

Paralysis of the Bladder from Progressive Locomotor Ataxia.—A lady who had been affected with locomotor ataxia for more than a year, came under my care for retention of urine. I found that there was some decomposition of the urine, but nothing else to distinguish the case from paralysis of the bladder, occurring in other cases of disease and injury of the spinal cord. The attendant was advised to use the catheter regularly, and to wash out the bladder with a solution of borax—one drachm of borax to a quart of warm water. I learned subsequently that this patient had incontinence of urine before she died.

II. **Derangements due to Abnormal Conditions of the Urine.**—The bladder being made to contain urine, almost constantly uniform in its composition, it at once feels and responds to any abnormality. If the aberration is only occasional, the effects are slight and of short duration; but, if the abnormality be constant, or almost so, or if the altered urine has a hyperæsthetic surface to deal with, the results are more annoying.

Urine which is too acid or too alkaline, too limpid or too greatly concentrated, acts somewhat like a foreign body—it irritates, and the bladder inclines to expel it.

Deposits of any of the urinary solids in the viscus may produce an irritable condition, and, if unchecked, lead to organic disease of the bladder. Uric acid, in large or small crystals, in little masses, forming gravel and minute calculi, the amorphous urates, the triple and amorphous phosphates (these, as a rule, however, occurring only in decomposition of the urine), and oxalate of lime may give rise to considerable trouble. There are some other deposits, such as cystine, that are of such rare occurrence that they need not be mentioned in this list. In any of these cases, but especially when there is a deposit of uric acid, there may be one of two things resulting; and, in order to treat the case properly, they must be borne in mind: First, a real excess of the salt in the urine; and second, a condition of the secretion, where, whether the amount of salt present be normal, or less or more than normal, it will be precipitated in the bladder.

As an example of the first may be mentioned some cases of dyspepsia, when, owing to a defect in either primary or secondary assimilation, the salt or salts are eliminated by the kidneys greatly in excess of the normal. Here a normal or even an abnormal amount of water in the secretion could not hold them in solution, and they are consequently precipitated.

As an example of the second may be taken some cases of hepatic disease, in which, although the uric acid is eliminated in abnormally small amount, it is precipitated on account of the deficiency of water, excessive acidity, and possibly too rapid absorption of the watery element of the urine while in the bladder.

In some cases with an excess of salts, there may be excessive acidity and lack of water. Some forms of dyspepsia are notable examples of this, and as low nerve condition frequently accompanies these disorders, the abnormal urine meets in the bladder with an irritable mucous membrane. In these cases the acidity is quite as hurtful as the deposit.

Deposits of oxalate of lime in the bladder are not so common (except in lime-water regions) as those of uric acid. In cases of the persistent deposit of oxalate of lime in the urine, known as oxaluria, there is usually marked irritability of the bladder. This has been ascribed by some to the presence of minute octahedra of this salt irritating the mucous membrane. It is more than likely, however, that the derangement of the general nervous system, always existing in these cases, stands as a *propter* rather than a *post hoc*, and that the bladder difficulty is but a local manifestation of the general disease, and consequently a pure neurosis. That the urine of oxaluria does possess irritant properties there is but little doubt, but it is hardly likely that the symptoms here occurring would be produced unless there was already an abnormal condition of the vesical mucous membrane.

Many authors hold that the high specific gravity of a single specimen of urine must not be taken as an evidence of concentration, or the low gravity of excessive limpidity of the twenty-four hours' urine. This is very true in regard to the total amount passed in a day; but as the bladder has to do each time only with the urine in it at that time, it will be well in these cases to examine several specimens in a day, rather than to depend for information on the reaction of the total amount of urine passed.

Urine may irritate the same patient at one time from being too limpid, and at another time from being too highly concentrated. These variations must be carefully watched and treated. A bladder that is irritable at all times and with urine of varying reactions, may be set down as one affected with a pure neurosis, if no organic cause be found, for the urine could not work the mischief continually, if normal at certain periods.

Symptomatology.—Patients suffering from this affection usually complain of frequent urination and vesical tenesmus.

In some cases there is smarting pain in the urethra during the passing of water and for some time after, and there is a sense of heat in the bladder and a desire to urinate which are not fully relieved when the bladder is empty. This last-named symptom belongs more especially to those cases in which the urine salts are in excess. When the urine is defective in the salts, that is, when the urine is limpid, the only symptom present is frequent urination. It will be observed that these symptoms are the same as those presented in a variety of affections, and hence can not be depended upon in making a diagnosis.

Diagnosis.—The diagnosis must be made by excluding all other conditions which give rise to this derangement of function, and by repeated examinations of the urine, which will show its abnormal state.

Prognosis.—The relief of this class of cases will depend upon the possibility of correcting the constitutional affections which produce the pathological state of the urine.

In case the abnormalities of the urine persist for a long time cystitis and urethritis may be produced. I am sure that I have seen cystitis which could be traced to long continued abnormal states of the urine.

Causation.—In discussing the pathology of this class of functional derangements the causes which produce them have been fully brought out, so that they need not be repeated here.

Treatment.—In cases of concentration of the urine due to acute febrile action, the patient should be liberally supplied with cooling drinks; and as in these affections the urine is generally too acid, the slightly alkaline, effervescing waters will be found useful.

In digestive troubles, with excessive acidity or saline deposit, attention should be paid to diet, bathing, and regularity of the bowels, as well as the taking of a proper amount of exercise. Where deposits of uric acid take place there is usually some defect in either primary or secondary assimilation. This should be sought out and remedied. In excessive acidity with deposits of uric acid, the alkaline carbonates act in a double way; first by neutralizing the acidity of the urine, and second by acting on the liver to lessen the amount of uric acid produced. The following is a very pleasant and efficient prescription in these cases.

℞. Potassii bicarbonatis,
Potassii citratis........................āā ʒ ss.
Syrupi simplicis.................... ʒ iv.
M. ——

Sig. Take ʒ i in half a tumbler of water, adding ʒ ij of lemon-juice. Drink while effervescing.

The late Prof. Armor gave some very excellent advice regarding the management of such cases, which I will reproduce in his own words:

"When the urine is acid in any of the forms of cystic irritation, great relief is experienced from the use of alkalies, especially when administered in an infusion of buchu. I regard buchu as a remedy of undoubted efficacy in all cases of vesical irritability. It seems to possess similar properties over the urinary tract that bismuth does over the intestinal, and is an admirable vehicle in which to administer the various alkalies. The citrate of potash with buchu is an excellent combination where we desire the joint action of these remedies. The liquor of potash, the bicarbonate and the iodide of potash also possess a high degree of utility in the class of cases referred to, and their therapeutic action is certainly never disturbed by administering them in an infusion of buchu.

"In irritable conditions of the bladder associated with a gouty and lithic-acid diathesis, the carbonate of lithium is a remedy of undoubted efficacy. It perhaps excels the preparations of potash in rendering uric acid and the urates soluble."

The following is the formula of a prescription which answers well:

℞. Lithiæ carbonatis...................... ʒ ij.
Acidi benzoic .... ʒ iij.
Sodii boratis .... ʒ j.
Aquæ dest. .... ℥ iv.
M. Sig. One teaspoonful in a large glass of water.

Limpid urine is usually due to some general nervous trouble or cerebral disease. In such cases treatment should be directed to the original disease.

Deposits of amorphous or triple phosphates are rare, unless there is some organic disease of the bladder. Where the deposits are not due to decomposition, some decided nerve trouble is usually present, and here, as in limpidity, the attention must be turned to treatment of the general trouble.

In oxaluria attention must be paid to the moral, mental, and physical condition, and time must not be wasted in treating mere symptoms. In the way of medication, the following prescription is looked upon by many as almost specific in these cases:

℞.	Acidi nitro-muriatici diluti	ʒ v–vj.
	Tincturæ nucis vomicæ	ʒ iij.
	Olei gaultheriæ	♏xij.
	Aquæ ad	℥ iv.
M.		

Sig.—ʒ i in water before each meal. In some cases the pure non-diluted acid, freshly made up, acts better than the dilute. It should be given in smaller doses than the dilute, and in plenty of water at the time of taking it. In all cases of urinary deposits, water should be freely taken, and the greatest attention paid to general hygiene and to mental and moral surroundings.

Many of the slightly alkaline mineral-spring waters will be found of use, acting gently on the liver, flushing the kidneys and urinary organs, and slightly relaxing the bowels. A considerable quantity should be taken in the course of the day when the stomach is empty.

ILLUSTRATIVE CASES.

Irritation of the Bladder from Abnormal Urine.—A patient forty three years old, large and stout, had menstruated scantily for several months and, as the flow diminished in quantity and duration, she gained in flesh but not in strength. She had a very good appetite and lived very well, but she did not feel in her usual health. She noticed a gradual disinclination to mental and physical activity. Backache, headache, and wandering pains here and there, occasionally annoyed her. After these symptoms had continued for a time urination became more frequent and at times slightly painful. She noticed also that there was a sediment in the urine. These symptoms caused her to seek advice from the fear that she had Bright's disease. She was found to possess a very good organization; and there was no organic disease of any kind present. All the evidences of excrementitious plethora were well expressed in the abundant adipose tissue, coated tongue, constipation, muddy appearance of the eyes, full slow pulse, shortness of breath on exertion, depression of spirits, disposition to sleep, and at times sleeplessness. The urine was examined, and found to be slightly alkaline. The specific gravity was 1030. There was neither albumen nor casts. The salts of the urine were in excess, but as a quantitative analysis was not made the exact composition of the urine was not obtained. The diagnosis of general excrementitious plethora from imperfect elimination was made, and the frequent urination was attributed to the abnormal condition of the urine. Ten grains of pil. hydrarg. and one grain of ipecac were given at bed-time and a Seidlitz powder an hour before breakfast the next morning. This was repeated in five days.

The quantity of food was diminished—she had been taking extra diet to make her stronger—milk was the chief article permitted, with a very little animal food once a day. A Turkish bath twice a week and gradually increased out-of-door exercise. The bowels were kept rather free by giving a dose of Congress water an hour before breakfast every morning. Under this treatment she improved in every way. The irritation of the bladder subsided, and has not returned. The urine is now normal.

Frequent Urination from Abnormal Urine.—An unmarried lady, thirty years old, of good constitution, very ambitious and energetic, overtaxed herself during the winter, and toward the end of the season, began to suffer from frequent urination and a sense of burning heat in the bladder and urethra after urinating. After a time these symptoms became very annoying, and as she was a nervous, sensitive person, she suffered quite severely. She was found to be quite out of health. Her appetite was poor and her digestion impaired; she was constipated, and suffered from rheumatic pains in her joints, and in the back of her neck. In short, she gave a fairly good history of dyspepsia and neuræsthenia plus the irritation of the bladder which was her chief source of discomfort. The urine was diminished in quantity, dark in color, very acid, and of high specific gravity; no albumen or casts were found. She had been quite free from any affections of the pelvic organs, the present disturbance of the bladder being the only suffering she had ever had in that regard.

My first impression was that she had cystitis, but there were no products of inflammation found in the urine, and therefore the diagnosis was made as stated above.

Peptonized milk was ordered with raw eggs, and, in addition, barley gruel, clear soups, and bread. Two drops of liquor ammoniæ in a wine-glass of water were given every two hours until the urine became normal. Her bowels were kept regular by small doses of Rochelle salts and cream-of-tartar taken in the morning.

Rest was insisted upon, and massage every third day. As soon as the urine became less acid and dense, she obtained some relief, but was not restored to her usual condition. It was not until her general health had been improved that the urine became normal and the irritation of the bladder finally left. An interesting point in the treatment was observed. For a time she was partially relieved by the alkaline remedies, but, when she ceased taking them, the irritation of the bladder returned.

When her general health was restored by rest and tonics the urine became normal, and the irritation of the bladder disappeared entirely.

At the present time I have a lady under treatment for specific disease of the uterus; during the last four weeks she has had irritation, causing frequent urination. She obtains relief by drinking very freely of lithia water.

Case of Baruria (by Dr. Samuel West).—The patient, aged thirty-nine, complained, after catching cold, of pains and aching in her limbs, which became severe enough after a week to keep her in bed. When admitted, these pains continued, but there was swelling of joints. The temperature was 100°, and she perspired freely, but the sweat did not smell sour. The urine had a specific gravity of 1040, and yielded copious crystals of nitrate of urea, with nitric acid. Her appetite had been for some days almost absent, and in the hospital she took but a little milk or beef-tea. For two days the condition of the urine was the same, and the percentage of urea 5·1. This percentage gradually fell to normal, and, as it did so, all the patient's symptoms disappeared. The case was regarded as one of baruria. The account of the case given by Prout was summarized and compared with the present case, and reference was made to other authors, by some of whom the existence of the affection was questioned, while by others it was not referred to. A somewhat similar case, the result of overfeeding and constipation, has been described, in which like symptoms were associated with a high percentage of urea, and disappeared when the amount became normal.

III. **Derangements of Function due to Affections of the Pelvic Organs other than the Bladder.**—Functional diseases of the bladder, caused by disorders of the neighboring pelvic organs, are frequently met with in practice. In this class the vesical trouble is secondary to some primary and more important affection, but the derangement of its function is often the most prominent and troublesome symptom; hence it is important to understand its relation to the primary disease, in order to make a correct diagnosis, and to treat such cases properly.

This class of functional disorders frequently resembles in history some of the organic diseases of the bladder, so that care is necessary to distinguish the one from the other. What I may say upon the subject will have reference to diagnosis only. When we know that the bladder trouble is due to disease of some other organ, attention is at once turned to the primary affection. These facts must be borne in mind, and the symptoms not mistaken for the disease.

Diseases of the rectum affect the bladder sympathetically. Irritation and pain in the rectum from any cause affect the bladder more or less. Chronic hæmorrhoids will cause frequent urination, and so will rectal fissure, especially after defecation. Abscesses in the neighborhood of the rectum will frequently cause retention of urine.

One very interesting case of this kind occurred in the practice of my friend Dr. Cushing. The patient had an abscess in the neighborhood of the rectum which caused retention of the urine, and this in turn caused acute renal disease. After the bladder had been emptied and kept from overdistention for some time, the urine was examined and found to contain albumen and casts. She made a rapid recovery, and all evidence of kidney-disease soon disappeared.

Very troublesome vesical irritation may come from ascarides. The itching of the anus and rectum, caused by these troublesome little worms, keeps up an almost constant desire to urinate. Children are most troubled with these parasites, but women often suffer in the same way.

Marion Sims points out the interesting fact that almost all cases of vaginismus are accompanied by an irritable condition of the bladder, and that, as the terminal fibers of the hymen often extend from the meatus to the vesical neck, cystospasm may in these cases be due to reflex nerve irritation. An attempt to catheterize these patients is as liable to cause spasm of the bladder as an analogous attempt to examine the uterus would be to produce vaginismus. In these cases the hymen should be excised, and the vaginismus treated after the usual methods.

Acute pelvic peritonitis and cellulitis cause great distress in many cases by their effect on the bladder. A constant desire to urinate, without the ability to make sufficient straining effort to accomplish the object, is very often observed in all these acute pelvic inflammations. The disturbance of the bladder is, of course, only a symptom of the primary and more important trouble, and simply requires to be mentioned here. The after-effects of pelvic peritonitis are what I especially desire to call attention to at present.

The adhesions formed by the products of the inflammation of the pelvic peritonæum are in some cases sufficient to prevent the normal filling of the bladder, and frequent urination then becomes a necessity. This derangement of function generally exists alone. The urine is retained without trouble up to a certain amount; it is passed without pain, and no vesical tenesmus follows evacuation. Unless the contraction of the bladder is great, and the frequent necessity to urinate very troublesome, patients rarely consult a physician for it.

Paralysis of the bladder with retention may be caused by a peculiar condition of œdema, by which the detrusors are rendered powerless to act. It is usually caused by disease of the cervix uteri, parametritis, or peritonitis.

CHAPTER XLI.

METHODS OF EXPLORATION OF THE BLADDER AND URETHRA.

Preparatory to the study of organic diseases of the bladder and urethra, I desire to call attention to the methods and means of exploring the bladder and urethra, and to some of the physical signs of disease obtained thereby.

In all cystic affections the urine should be carefully examined, both chemically and microscopically. It is not necessary for me to describe the methods to be employed in this examination; they will be found in the various books published on that subject. I may, however, in passing, state that the condition of the kidneys is better determined by ascertaining the quantity of urea eliminated than by examining for albumin or casts. This will be referred to again in discussing the diagnosis of cystitis.

If an examination of the urine does not make the diagnosis clear, attention should be directed to a physical exploration of the bladder and urethra. For this purpose either a digital or an endoscopic examination may be made. Digital examination per vaginam is one of the most valuable means of investigating the bladder and urethra. By this and by the bimanual touch the physical signs of many of the affections of these organs can be readily obtained.

The method of making these examinations is exactly the same as practiced in examining the uterus. The vaginal touch reveals the position of the bladder and urethra, the degree of their sensitiveness, the location of tenderness, if any is present, the increase or diminution of elasticity, and the state of their walls, as regards thickening or irregularity. Distortions of the urethra from neoplasms or the products of inflammation can also be detected in this way.

The bimanual touch will show whether the bladder is full, empty, or partially distended, and any foreign body of considerable size can be felt in the bladder in case the abdominal walls are not too rigid. As a means of detecting stone in the bladder of women, the bimanual touch is the easiest, safest, and surest of all methods of exploration. The presence of neoplasms can be discovered in this way, although their composition can not be clearly made out. In some cases it is necessary to give an anæsthetic to relax the parts before a satisfactory bimanual examination can be made. There are many advantages gained in anæsthetizing the patient while making a bimanual examination, but some of the most important signs may be lost by the unconsciousness of the patient, such, for instance, as the location of tenderness. On that account I prefer in critical cases to make an examination both without and with anæsthesia. It is also well, when the object is to search for foreign bodies, like stone or tumors of any kind, to have a few ounces of urine in the bladder, unless that much gives the patient pain. The longer I practice the more I depend upon this method of examination.

Another method of examination is by means of the endoscope. For this purpose I devised and have employed for years an endoscope which has proved of great service. This instrument is composed of three parts. A glass tube (*a*, Fig. 251) is shaped like the ordinary test tube used by chemists, except that the mouth is a little more flaring. The second part (*b*, Fig. 251) is composed of two pieces—a mirror and its holder. A piece of very thin silver plate is made to fit nearly the whole length of the inside of the glass tube, and about one third of its circumference. To the end of this arrangement the mirror is attached at an angle of about 100°. At the other end a delicate handle projects at an obtuse angle. This part of the instrument looks like a section of a tube that has been divided into three equal parts by longitudinal section, with a mirror attached at one end and a handle at the other. This piece is made perfectly black on the inside, and answers two purposes—it holds the mirror, and, when placed in position for use, darkens one side of the glass tube.

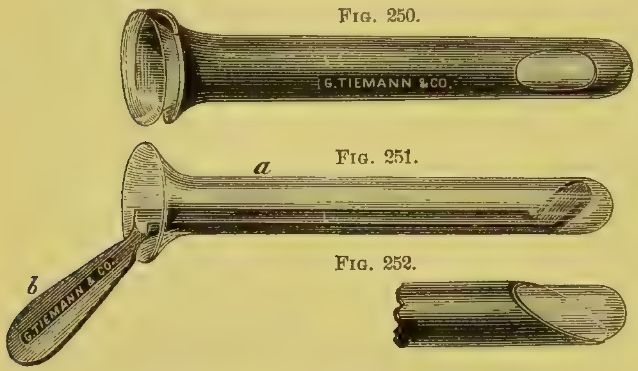

Fig. 250.

Fig. 251.

Fig. 252.

Figs. 250–252.—Skene's endoscope.

It will be seen that the mirror can be moved forward or backward, and turned around; so that when the tube is introduced into the urethra or bladder the exposed internal surfaces can be brought into view by moving the mirror while the tube remains stationary.

Fig. 250 shows the glass tube placed inside of a fenestrated hard-rubber speculum, and Fig. 252 shows the glass tube inside of a speculum that is open and beveled at the end. These specula are used in making applications to the urethra and bladder, as will be described hereafter.

The method of using this instrument is as follows: The tube, with the mirror inside, is introduced into the urethra, and bladder also, if an examination of the lower portion of the latter be desired. Formerly I used a concave mirror to throw in the gas or electric light, but now I use the following improved urethroscope with electric light: The instrument consists of a chamber of convenient size, which has a second chamber or housing built upon its center. The upper or vertical chamber contains an electric lamp. The rays of light are thrown upon a mirror, which is placed in an oblique position immediately below the lamp. The light is reflected upon the mirror to the front of the instrument, and through any urethral tube which may be attached. The mirror has a perforation in its center, through which the operator sees the parts to be examined. The eyepiece has the proper magnifying lenses, and is adjustable, so that the focus can be changed to suit tubes of various lengths (see Fig. 253). The complete instrument, as illustrated, has three sizes of straight urethral tubes and a Skene's endoscopic tube, with a mirror on the distal end of an adjustable stem. This enables one to examine the entire length of the female urethra through the glass tube, which is held in position while the mirror is inserted or withdrawn.

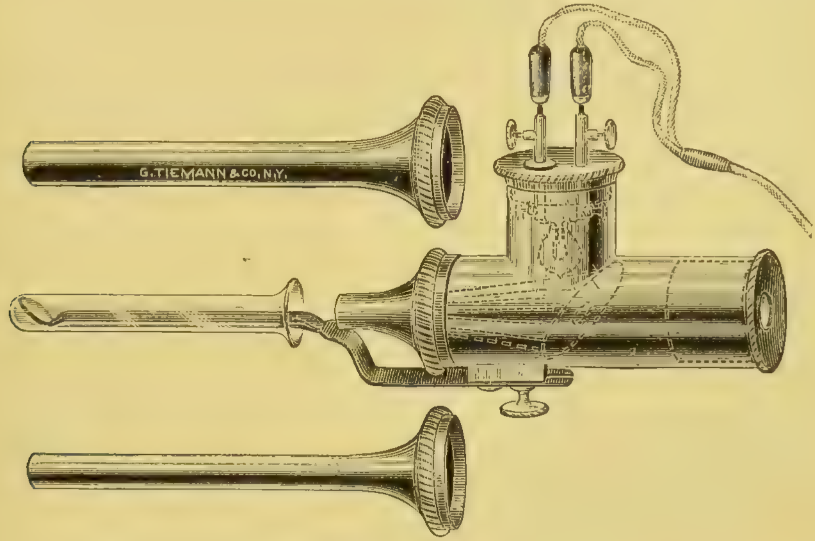

FIG. 253.—Urethroscope with electric light.

The color of the mucous membrane lining the urethra and bladder has already been described; but it must be borne in mind that the endoscope modifies the color to some extent. This is especially so when examining the urethra. If a large-sized tube is used, the parts are put upon the stretch, and the pressure of the glass on the mucous membrane interrupts the capillary circulation to some extent, and renders the color as seen in the mirror a pale pinkish white. This, when understood, does not interfere with the examination, as it only tends to make the contrast between the normal and the diseased tissues more marked. The only condition where the endoscope might lead to error is in acute general congestion of the urethra. The pressure of the instrument causes the congestion to disappear in part, and gives the idea that there is less hyperæmia than there really is. In such cases I use the speculum or the ordinary endoscope (Fig. 252), and thereby remove all possibility of error.

By a little practice in managing the light, sufficient dexterity to examine the urethra and neck of the bladder thoroughly and satisfactorily can soon be acquired.

Cystoscopy.—The cystoscope of Nitze and Leiter is the instrument usually employed for thoroughly investigating the bladder. Bruck, of Breslau, first discovered the principles of the instrument, and Nitze and Leiter perfected it.

The cystoscope (Fig. 254) consists of a silver tube of the shape of a catheter, in the short beak of which a platinum wire is fastened.

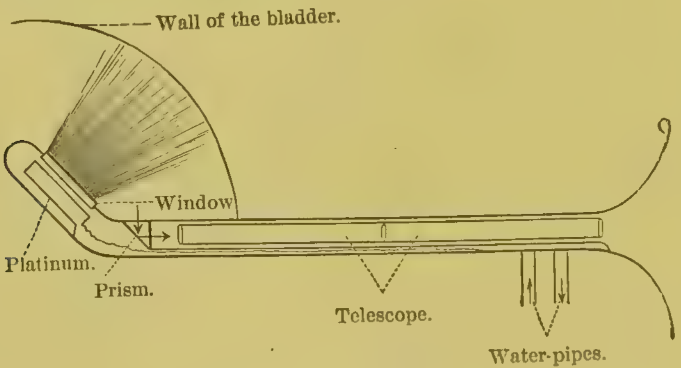

Fig. 254.—Cystoscope.

The latter is made incandescent by means of an electric current which passes through it, and then darts its rays upon the wall of the bladder through an oval window in the concavity of the beak, covered with transparent quartz. To convey the current of electricity to the platinum, an insulated wire runs through the whole length of the shank; the metal of the tube forms the connection with the opposite pole. No cold-water current is needed. According to Nitze's design, a telescope is introduced into the shank of the cystoscope. It enlarges and magnifies the spot coming into sight. Without this telescope we should not see much more at the time than a spot about the size of a pea; with it we are enabled to inspect a portion as large as a silver dollar, and even more.

At the junction of beak and shank, corresponding to the concave side, a rectangular prism is cemented in, the hypotenuse-plane of which acts as a mirror on account of the total reflection of the rays. Thus a diminished, inverted real picture arises in the shank of that wall of the bladder which is situated at a right angle to the longitudinal axis of the instrument, and opposite the prism. It is again inverted by means of the lenses of the telescope, and thrown to the outer end of it, where the examining person looks at the now upright picture through the magnifying ocular of the telescope.

If the fundus of the bladder is to be inspected with this instrument it must be turned 180°, and its handle deeply depressed between the thighs of the patient, the latter being in the recumbent (lithotomy) position—the best for examination with the cystoscope.

This manipulation may sometimes be very painful. To avoid this, a second instrument (Fig. 255) is made with the window for the incandescent platinum on the convex side of the beak. There is another window at the end of the straight tube through which the observer looks with the telescope. Of course there is no prism.

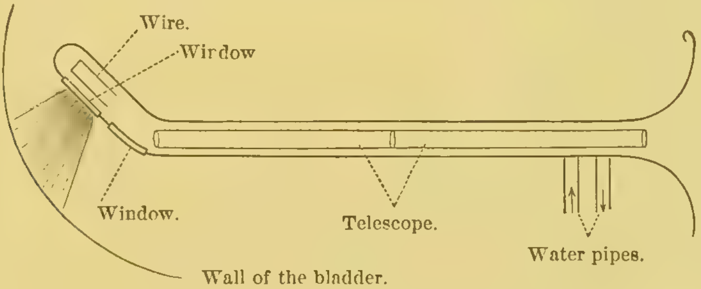

FIG. 255.

Leiter's cystoscope shows the old pattern with the improvements mentioned. A key near the handle can be made to make or break the current by turning to the right or left upon or from an ivory plate. The shank of the instrument is somewhat short; its telescope diminishes the part in view a trifle.

Before using the cystoscope the beak should be put in water, and the light tested to see that it is in working order. Glycerin should be used to lubricate the instrument. The bladder must be washed, provided the urine is bloody or cloudy with mucus, and then be partially distended with from five to six ounces of clear water. If the urine is quite clear no preliminary washing is necessary.

A few years ago Howard A. Kelly gave to the profession his method or system of investigating the diseases of the urinary organs of women, which I consider a most valuable contribution to this branch of surgery, especially in the management of the class of cases now to be considered. The original element in Kelly's method is placing the patient in the Trendelenburg or knee-chest position while using the endoscope for the purpose of making a diagnosis, and in catheterizing the ureters, and for direct treatment of the urethra and bladder. His modification of the endoscope and his way of using it are no doubt improvements of great value, but are not likely to supplant other ways of exploration for diagnostic purposes.

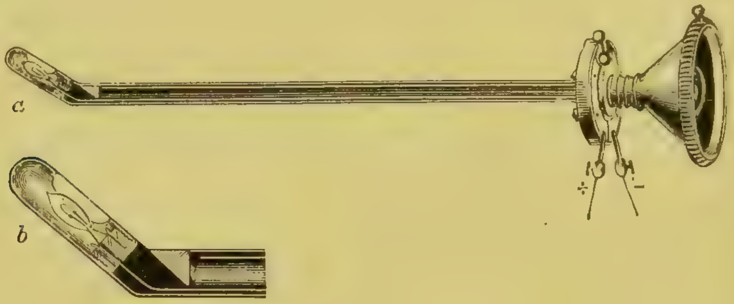

Fig. 256.—Leiter cystoscope.

For inspecting the bladder and urethra the older ways are preferable, and in catheterizing the ureters the newer method of doing so, with the aid of the cystoscope, is easier for some of us. The objections to the general employment of Kelly's method of examination are that rapid and extensive dilatation of the urethra are necessary, and that it requires the patient to be anæsthetized. Taken altogether, it makes the examination really a formidable operation. Dilatation of the normal urethra is an outrage that often does damage that is not easily relieved. Since the discovery of the germ causation of surgical diseases practitioners have felt safe in being surgically clean in their work, and have become unmindful of the fact that injuries such as abrasions, contusions, or lacerations of the mucous membrane of the urinary tract often cause serious trouble. There is no reliable tendency to repair injuries of tissues that are continually bathed with urine, and when the urine is abnormal very serious results may follow the slightest traumatism. In view of these facts, and recalling the results of the practice of a few years ago, when dilatation of the urethra was in fashion for diagnostic purposes and for the relief of certain affections, one shrinks from the risk of adding to the list of cases of incontinence and chronic urethritis. In my hands some slight disturbance has often followed the use of the cystoscope of Nitze and Leiter, which raised the same objection to its use as to Kelly's instrument. Owing to the sharp flexion at the point of the instrument it could not be passed through the ordinary-sized urethra without causing pain and doing some little damage. These difficulties were all overcome by having a cystoscope made straight. This improvement has been a great help to me. With this instrument the female bladder can be explored without pain or injury, excepting when its walls are thickened and contracted so that it will not hold the required amount of water. In such cases Kelly's method meets the requirements most admirably. At one time I was unable to use the cystoscope when there was hæmorrhage from vascular neoplasms or ulceration. Then I looked to Kelly's method for aid, but I found it was not satisfactory, because the blood obscured the field of vision and one could not see what it came from. This obstacle can be overcome by prolonged washing of the bladder with a solution of acetic acid, which controls the bleeding, so that there has been no trouble in this respect since adopting this plan.

In cystitis and urethritis together the use of the endoscope and cystoscope is painful, but the application of cocaine overcomes that difficulty. Instilling into the urethra a two-per-cent solution of that local anæsthetic renders the parts tolerant to the use of the instruments in most cases. To obtain the desired anæsthesia, a mild solution should be repeated as many times as is necessary. That is safer and more efficient than one application of a strong solution.

I can safely say that with the straight cystoscope the bladder can be examined with as much facility as one can make a speculum examination of the uterus and vagina, and with no more distress to the patient. And I am sure that it is not claiming too much to say that all structural changes, gross and minute, can be seen and studied far more clearly than by any other method of inspection yet discovered. For examination of the urethra I still use my old endoscope, perhaps because I am used to it, but I must acknowledge that the older endoscope, improved in mechanism by Kelly, is more easily employed and satisfactory to the majority of surgeons.

W. Donald Napier has invented a probe that is of use in detecting foreign bodies in the bladder. No dilatation of the urethra is needed for its use. It consists of a beaked sound, the vesical end of which is covered with pure metallic lead. This, having been carefully polished with soft leather, is dipped into a one-per-cent solution of nitrate of silver, which gives it a beautiful black coating.

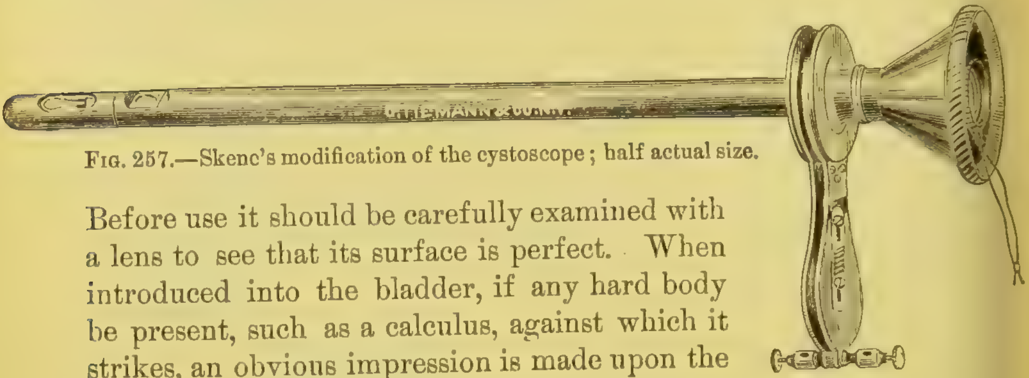

FIG. 257.—Skene's modification of the cystoscope; half actual size.

Before use it should be carefully examined with a lens to see that its surface is perfect. When introduced into the bladder, if any hard body be present, such as a calculus, against which it strikes, an obvious impression is made upon the polished surface.

Exploration of the bladder by dilatation of the urethra is a most valuable means of diagnosis. It may be employed in various degrees. The urethra may be enlarged only sufficiently to admit a fair-sized endoscopic tube, or it may be dilated sufficiently to admit the finger. I will first give the methods that are commonly in use, and then explain the plan I usually adopt. Although there are records of bloodless dilatation of the urethra as far back as 1502 (Benivienni), 1506 (Marcus Sanctus), and 1561 (Franco), up to a late date the operation was not a common one. Franco used an instrument of his own for effecting dilatation. In the early part of the present century dilatation by means of the compressed sponge and Weisse's metal dilator was somewhat used, but more for the extraction of calculi and foreign bodies than for purposes of diagnosis.

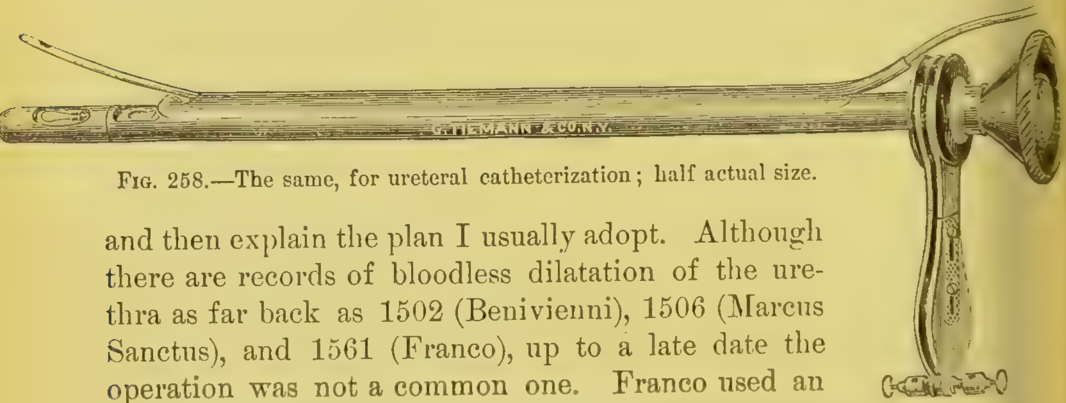

FIG. 258.—The same, for ureteral catheterization; half actual size.

To Simon, however, belongs the honor of improving the means employed and introducing the subject to the profession. His method is this: He makes a single incision superiorly, or two slight lateral ones, in the wall of the meatus, about one tenth of an inch in depth. He also snips the urethro-vaginal septum to the depth of about one fifth of an inch. This is done to relax and prevent irregular tearing of the meatal portion of the urethra, which is the most rigid and undilatable part of the canal.

He next introduces a hard-rubber speculum, shaped somewhat like a cone, the cut end of which is protected by a rounded piece of wood within. His largest speculum has a diameter of nearly one inch, his smallest about one third of an inch. After the introduction of the largest one the finger can be readily passed into the bladder and the whole of its interior explored, save the antero-lateral portion, which is high up and difficult to reach. The narrowest urethra may in this manner be sufficiently dilated in from five to ten minutes.

Simon found that, without any bad results following, an adult woman could bear the introduction of a speculum having a circumference of two and a half inches, and, when the necessity for marked dilatation was urgent and possibly resulting incontinence of comparatively little importance, a cone having a circumference as high as two and eight tenths inches might be employed.

In girls, specula having a circumference of from 1·88 inch to 2·52 inches may be used. For most diagnostic and therapeutic purposes, instruments not large enough to produce incontinence are usually sufficient.

Winckel has used Simon's method seven times, and has had excellent results; and he says that, although the incisions made at the meatus are sometimes opened still farther, and that a fresh one may appear under the clitoris, it is of little moment, as the presence of the dilator stops all hæmorrhage, and the incisions heal readily. In none of Winckel's cases, although he watched them for weeks, was there any incontinence. Heath, in digital dilatation, found usually a tearing of the mucous membrane under the pubic arch, and incontinence was generally present for at least twenty-four hours.

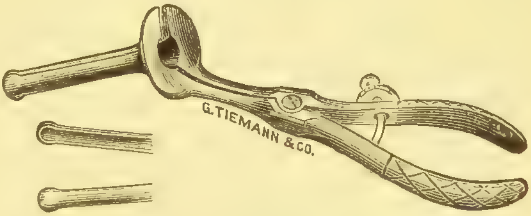

FIG. 259.—Bivalve urethral speculum (Skene).

Instead of incising the meatus, I generally dilate it slowly, using for this purpose the bivalve urethral speculum (Fig. 259). When used as a dilator, I cover the blades with a piece of soft-rubber tubing.

Notwithstanding the testimony to the contrary, I am sure that dilatation of the urethra to any great extent is dangerous. There is a liability to lacerate the urethra and cause incontinence, which can not be easily cured. Great care should therefore be exercised in dilatation, and it should not be resorted to at all unless there is some marked indication for it.

In cases where extreme dilatation of the urethra does not prove sufficient for the desired end, the method of opening into the bladder through the vaginal wall, as recommended by Simon, may be tried. He makes an incision from right to left into the anterior vaginal wall just in front of the os uteri. From the center of this incision another is carried forward about one inch in length in the line of the urethra, thus forming a T incision. Fine tenacula are then fastened into the bladder-wall through the incision, and, with one hand pressing the abdomen, and by traction on the tenacula, the bladder is pulled down through the incision and opened. After all necessary procedures are completed, the edges should be carefully secured by sutures, and the parts will heal kindly. The bladder-walls coapt readily and accurately.

It will be understood that this important operation is only to be performed for the purpose of detecting and removing foreign bodies and abnormal growths from the bladder, and possibly to close vesico-intestinal fistulæ.

Rapid dilatation of the urethra is chiefly useful for the purpose of allowing the extraction of foreign bodies and moderate-sized calculi, for cauterizing the mucous membrane, for opening hæmatoceles (Spiegelberg), for allowing the introduction of endoscopic tubes of large size in diagnosticating cystitis, calculi (vesical and ureteral), ulceration, vesico-intestinal fistula, polypi, and papilloma, and for the local treatment of these.

Incision into the bladder, on the other hand, is useful in cases where calculi or other bodies are too large for safe removal by the urethra, the removal of tumors situated high up anteriorly or antero-laterally, in operations of various kinds where the urethra precludes free movement and good illumination, as in sewing up large vesico-intestinal fistulæ. I may observe, in passing, that, in performing operations through the incision, artificial light might be thrown into the bladder by means of a small curved endoscopic tube and concave mirror in the urethra.

In cases of cystitis and vesical ulceration this operation has been performed by Sims, Emmet, Bozeman, Simpson, Hegar, and Simon, to prevent the stagnation and decomposition of urine in the diseased organ.

Catheterization of the ureters has been performed by Simon and Winckel, but as it is difficult, not without danger, and of little practical value, I shall not dwell upon it here.

In connection with the subject of physical exploration, I give here a list of the various instruments that I find of use in examining and operating upon the bladder and urethra. They are as follows:

Two Skene's Sims's specula.

One Folsom's speculum (modification).

One Skene's reflux catheter for urethra.

Two silver probes.

One sponge-holder (steel).

One knife.

One Blake's polypus-snare (ear).

One Allen's polypus-forceps (ear).

Two glass pipettes, six inches long.

Two head-mirrors on same strap, three and a half inches and one and a half inch.

Skene's bivalve urethral specula.

Ordinary urethral endoscopes, modified by Skene.

Two rectal endoscopes (long and short), with fenestrated rubber specula.

Three urethral endoscopes (Nos. 13, 15, 17, American), with beveled rubber specula.

Two beveled urethral endoscopes (Nos. 19, 21, American), with fenestrated rubber specula.

One brush for cleaning endoscopes.

Having described the important methods to be employed in physical exploration of the bladder, I now pass to a consideration of the organic diseases of the bladder and urethra.

CHAPTER XLII.

ORGANIC DISEASES OF THE BLADDER.

HAVING treated of the methods of physical exploration of the bladder and urethra, I now invite attention to the organic diseases of these organs, and shall first describe those which affect the bladder. These may conveniently be divided into three classes:

I. Inflammatory; II. Non-inflammatory; and III. Neoplasms, hyperplasia, and atrophy.

I. *Inflammation of the bladder, or cystitis:*

Under this head I shall include all forms of deranged nutrition which produce disorders of function, temporary or permanent lesions of structure, and the morbid material known as the "products of inflammation."

Well-defined typical inflammation presents during its course certain peculiarities which are characteristic of the affection, and without the existence of which the disorder can not be called true inflammation. Inflammation, however, varies in character with the tissue or organ involved and the extent or intensity of the disease; and, while there is really but one process of inflammation, as that process is often interrupted, prolonged, or modified in various ways, its products must necessarily vary greatly.

Its divers grades or forms are distinguished as acute, chronic, catarrhal, interstitial, suppurative, croupous, diphtheritic, and gonorrhæal.

Before entering upon the consideration of cystitis in its many forms, I desire to speak of hyperæmia and hæmorrhage of the bladder. This latter affection might more properly, perhaps, be considered under another head, but it is so closely connected with hyperæmia and inflammation that I prefer to treat it here.

Hyperæmia.—In all cases the first perceptible departure from the normal is a derangement of circulation. Hyperæmia of the mucous membrane is observed, and with it disorders of innervation, as is evidenced by derangement of function and sensation.

In hyperæmia of the mucous membrane of the bladder the blood-vessels are distended, and, becoming prominent and apparently more numerous, give to it a bright-red color. The arteries are the first to be affected. If the hyperæmia is not marked, or is produced by some transient cause and not aggravated, it may pass off in a short time, and leave the membrane in its normal condition. If it is of a high grade, however, rupture of some of the vessels may occur, the hæmorrhage taking place either on the free surface of the membrane or beneath its epithelial layer. Should this condition continue, the hyperæmia which began in the arteries extends to the venous side of the circulation, and the vessels become more prominently and uniformly distended. The congestion may also begin on the venous and extend to the arterial side, as in sudden interference with portal circulation. As a rule, however, it begins in the arteries.

A clear distinction must be made between the acute congestion of which I am now speaking, and which is chiefly confined to the smaller vessels, and passive congestion with a varicose or hæmorrhoidal condition of the veins about the neck of the bladder. This hæmorrhoidal condition I will speak of later.

Symptomatology.—The symptoms of acute congestion of the bladder, as a rule, occur suddenly. Frequent but painless urination is the principal symptom. There is often a sense of heat and heaviness in the region of the bladder, which is greatly aggravated by standing or walking. When the urethra is involved, the patient complains that the urine "scalds" her.

The general system is not disturbed—i. e., the pulse and temperature remain normal. The physical signs are mostly negative. The composition of the urine is unchanged, save that there may be an excess of mucus and a few blood-globules present. There may be some tenderness on pressure over the bladder. The endoscope (when there is an opportunity to use it, which is very rare in this trouble) shows an increased redness of the mucous membrane, with occasionally an excess of mucus on its surface.

Diagnosis.—The diagnosis has to be made by exclusion, the natural history of the affection having in it nothing pathognomonic. It is liable to be confounded with sympathetic or other functional derangement of the bladder, caused by sudden dislocations of the uterus or by pelvic inflammation, such as pelvic peritonitis and its results. The former can be excluded by an examination of the pelvic organs, and the latter by the constitutional symptoms of inflammation and the signs of such pelvic disease.

Causes.—The causes of hyperæmia of the bladder are exposure to cold (especially during the menstrual period), wetting the feet, overtaxation in walking or using the sewing-machine, excessive venereal indulgence, constipation of the bowels from torpor of the portal circulation, the excessive use of stimulants, and the use of improper articles of food.

Treatment.—The treatment should be directed to equalizing the circulation. Diaphoretics, warm, stimulating foot baths, hot applications over the epigastrium, and, above all, rest in the recumbent position. If the bowels are confined, they should be emptied by saline laxatives. When there is much irritation of the bladder, causing frequent urination and vesical tenesmus, pulv. doveri with camphor should be given, or suppositories of belladonna and morphine introduced into the vagina. Under this treatment the trouble will usually pass off in a short time. It may, however, go on to the development of cystitis.

Occasionally bleeding occurs in active or acute congestion of the bladder, and that leads me to speak of hæmorrhage from the bladder.

Hæmorrhage from the Bladder.—Hæmorrhage from the bladder, or (if I may be allowed to coin a word) cystorrhagia, is usually due to some important disease of the bladder, and is, therefore, rather a symptom than a disease. For this reason I will at present confine my remarks to hæmorrhage when caused by acute congestion, which I have just considered, or to varicose veins of the bladder.

The bleeding may take place from the free surface of the mucous membrane, and mingle at once with the urine or coagulate in the bladder. It may also take place beneath the surface of the mucous membrane, and form ecchymoses, like the spots seen beneath the skin in purpura. We may also have a condition known as hæmoglobinuria, in which only the coloring matter of the blood is found in the urine; in such a case we should, of course, find no blood-corpuscles.

The quantity of blood varies greatly in different diseases, and in the same disease in different persons. In congestion of the bladder blood-globules will often be found in the urine only on microscopic examination, while at other times the urine will have the appearance of being all blood. Again, the blood may coagulate, and be passed in clots, or the coagula may remain in the bladder, finally break down, and be passed as a chocolate-colored or blackish matter.

Symptomatology.—The symptoms of hæmorrhage do not differ from those of congestion or the onset of cystitis, except when small clots form, distending the urethra, and causing pain in urinating. It is very rare that bleeding from these causes is sufficient to prostrate the patient.

As bleeding may take place at any point in the urinary tract, it is important always to locate the hæmorrhage. When coming from the bladder in any quantity, it is usually passed in small clots, and is seldom so intimately mixed with the urine as when it comes from the kidneys or ureters. This statement is not exact, and at best gives but a probable idea of the true facts. To complete the diagnosis, we must resort to something more trustworthy. Sir Henry Thompson gives a very ingenious method for determining as to whether pus found in the urine comes from the kidneys or bladder, and Van Buren and Keyes advise the same plan for detecting the source of hæmorrhage.

The method is this: "A soft catheter is gently introduced first within the neck of the bladder, the urine drawn off, and the cavity washed out very gently with tepid water. If the water can not be made to flow away clear, the inference is that the blood comes from the cavity of the bladder. If it will flow away clear, then the catheter is closed for a few moments, the patient being at rest, and the few drachms of urine which collect may be drawn off and examined. The bladder is now again washed out, and if, after a single washing, the second flow of injection is clear, while the drachm of urine was bloody, the inference is again complete that the blood comes from one or the other kidney."

When it is known that the patient has had no kidney-disease, nor symptoms of renal calculi, the endoscope may be employed, and possibly the bleeding-point found. This has been done with the instrument which I have described, but one may fail to find it if it be high up laterally or antero-laterally, or be covered by a fold of the mucous membrane.

Hæmorrhage from the urethra might mislead, but is easily detected if it is remembered that in this case bleeding occurs between the acts as well as during micturition. It may also readily be discovered with the endoscope, provided the tube be not too large.

Causation.—The causes of vesical hæmorrhage, or cystorrhagia, are numerous. Congestion, varicose veins, villous cancer, lesions of structure, as in ulceration and sloughing of mucous membrane from injury or cystitis, and obstruction to, or interference with, the portal circulation. This may possibly explain the fact that hæmorrhage occasionally occurs in those suffering from malaria. Perhaps the vesical hæmorrhage occurring in the intense heat of summer in the tropics may be thus explained. In malaria the obstruction to the circulation through the portal system, acting as a predisposing cause, the intense congestion of all the internal organs during a chill or from exposure to cold would certainly tend to produce cystorrhagia.

In purpura, the eruptive, typhus, and typhoid fevers, bleeding from the bladder may occur; but, as it is there secondary to the main disease, nothing need be said about it in this connection.

The most marked predisposing cause of cystorrhagia in women is a tendency to the hæmorrhagic diathesis, so common among chlorotic females.

Treatment.—The treatment must largely depend on the cause. In all cases rest in the recumbent position should be insisted on. A large number of hæmostatics have been recommended, and some of them, such as aromatic sulphuric acid, tannic and gallic acids, in moderate doses, are doubtless of some value. I have, however, depended chiefly on doses of opium sufficiently large to quiet the desire to urinate, and alkaline diluents to render the urine non-irritant, when it was found to be excessively acid.

If the bleeding-point or points can be discovered with the endoscope, applications of acetic acid, persulphate of iron, or nitrate of silver may be made. Great care must be taken in using these remedies, lest inflammation and ulceration of the bladder result. Nitrate of silver and strong acetic acid are more to be feared than the others.

When the hæmorrhage is so free as to excite fears of prostration, ice may be employed. Small smooth pieces should be introduced into the vagina at regular intervals as long as the patient can comfortably bear it. Ice may also be applied to the hypogastrium.

When the blood coagulates and forms a large clot in the bladder, it should be allowed to remain until it breaks down and comes away of itself. The experience of surgeons is that there is much more danger in attempting to remove the clot than in letting it alone There are two dangers in removing coagula from the bladder. One is, that doing so will almost certainly start the bleeding again; and the other is liability to injure the bladder, and cause inflammation. Let the clots take care of themselves, keeping the patient quiet and comfortable (with opium, if necessary) until the coagula are disposed of. Lime-water has been recommended as a solvent of blood-clots by Dr. J. H. Ledlin, of Pittsfield, Illinois, and, in the case reported by him, and which is narrated with the cases of hæmorrhage in this chapter, seems to have acted well.

In one case of traumatic vesical hæmorrhage that came under my care, a large clot formed in the bladder, and urination was completely arrested. I was unable to determine whether the inability to urinate was due to the presence of the clot or to loss of contractile power of the vesical walls from the injury. The patient suffered so much, however, from the pain caused by retention that I was obliged to use the catheter. I employed the flexible instrument of Jaques, and, by carefully worming it in past the clot, I succeeded from time to time in drawing off enough of the urine and broken-down clot to relieve the lady until she was able to relieve herself. I was careful not to disturb the clot.

Allusion has been made to varicose veins of the bladder, called by some hæmorrhoids of the bladder. This condition is chiefly found in pregnant women, especially those who have borne several children. The cause is interruption of the venous circulation by pressure of the gravid uterus. The veins of the anterior vaginal wall, introitus vulvæ, and labia, will often be found in the same condition. Occasionally prolapsus of the bladder will also be found.

This affection gives rise to those symptoms of pelvic distress and frequent urination that are so troublesome in some pregnant women. It must be kept in mind, however, that the same symptoms may come from pressure which does not produce varicose veins.

If it is found that the patient feels relieved to some extent in the recumbent position, and the urine is normal, this trouble may be suspected, and, if the symptoms are sufficiently urgent, a local examination should be made, which will reveal a varicose condition of the vessels of the urethra and vaginal walls, and from this it may be inferred that the same condition exists in the bladder.

If the diagnosis is still doubtful, the endoscope will aid in settling the question.

This affection is relieved or passes off altogether after confinement, and the best that can be done usually is to give rest and try to make the patient comfortable until the end of her "term."

Should the trouble continue after delivery, especially if there is cystocele or prolapsus of the bladder, much good may be done by restoring and keeping the organ in place. This can best be accomplished by using the cotton pessary or a roll of marine lint packed loosely into the vagina, like a tampon. The patient can be instructed to use this herself. Attention should be given to the general health, and particularly to the condition of the bowels and portal circulation. Rest in bed, and the use of cool water as a vaginal injection, may also be of use.

Should hæmorrhage occur from this condition of the veins, it may be treated as described in the discussion of that subject.

ILLUSTRATIVE CASES.

Case of Hæmorrhage of the Bladder; Blood-clots dissolved by Lime-water.—J. H. Ledlin, M. D., Pittsfield, Illinois, in a letter to the "Medical Record," November 8, 1879, says: I have a patient, a man who for years has suffered greatly from hæmaturia. The blood comes from the kidneys. At times the hæmorrhage is very profuse, and clots the bladder. Heretofore I have always succeeded in washing it out with a double current catheter. Last Saturday I was called to see him. He had lost a great quantity of blood, and was suffering very much from vesical tenesmus; I passed my catheter, and injected a stream of water. All at once the stream, returning, would stop. By withdrawing the instrument I could start it again, but he insisted there was a foreign body in there. I must say that the previous day he had experienced excruciating pain along the course of the ureter; I suspected stone, and sounded him, but could not discover one; still, my instrument touched something; I repeated the washing out of the bladder until the water returned colorless. I then made up my mind that there was a clot, with the coloring matter washed out, and, recollecting your account of dissolving the false membrane with lime-water, I threw in one half pint of lime-water, allowing it to remain half an hour. When it passed off it resembled what you describe as the appearance of the false membrane after lying in lime-water. He also passed a large piece of fibrin, which had evidently been acted on by lime-water, although not sufficiently to dissolve it entirely. Had it not passed away, I am convinced another injection would have dissolved it entirely. He is now quite comfortable, all sense of a foreign body in the bladder having passed away.

Hæmorrhage from the Bladder due to Malarial Influence.—This patient was a lady of twenty-one, married two years, never pregnant, and of a slightly strumous constitution. For several days she had to urinate more frequently that usual. She then began to be restless at night. These symptoms developed into well-marked fever in the afternoon and first part of the night. With this came frequent urination, with pain and hæmorrhage from the bladder. The blood came from the neck of the bladder evidently, from the fact that it was mixed with the urine, but was dark in color, as it would have been if from the kidneys. There was no blood passed after the bladder was empty, as would have been the case if it came from the urethra.

The temperature was 103° F. in the evening; normal in the morning. This continued for two weeks, at which time I gave quinine, gr. x, in the morning. After the quinia, the fever and bleeding stopped, and did not return. She was for over a year well, then her trouble returned—that is, she had painful urination without hæmorrhage. I found the cause to be a polypoid growth, which looked like a wart, in the anterior wall of the urethra near the meatus. I removed it by snare, with the result of relieving her completely.

CYSTITIS.

This is a disease that is much more common among women than is generally supposed. It is necessary, therefore, to inquire carefully into the etiology, pathology, and therapeutics of this affection, which causes great suffering on the part of the patient, and taxes the highest skill of the ablest surgeons.

To the several forms, grades, or degrees of this disease various names have been given, such as acute, subacute, and chronic cystitis, cystitis mucosa (catarrh of the bladder), interstitial cystitis, peri- and epi-cystitis, croupous, diphtheritic, and gonorrhœal cystitis. This medley of names should not be allowed to lead to confusion, but this fact should be firmly fixed in the mind, that, with the exception of the last three (the etiology and pathology of which are somewhat different), they are all simply steps or stages in one general process. Thus a patient may have received an injury of the bladder by the use of a catheter, causing an acute cystitis. This may end in convalescence, or merge slowly into the more chronic form, having very likely as an intermediate step catarrhal cystitis. This, too, may go on to recovery; but, if the process extends, and its severity increases, ulceration takes place, and the submucous and intermuscular tissues become involved, producing interstitial cystitis. If the inflammation extends still further, and involves the serous coat of the bladder, either by extension or ulceration, with or without perforation, we shall have peri- or epi-cystitis. In this example I hope I have made clear the fact that names are only given to denote the degree of intensity of the inflammatory process, and the character and extent of the tissue involved.

Inflammation of the mucous membrane alone is by far the most common form, and hence, in using the term cystitis, reference is usually made to inflammation of that membrane only. When other tissues are involved, or the character of the disease is peculiar, some qualifying word is added to distinguish it.

Acute inflammation of the bladder, other than that due to local causes, is emphatically denied an existence by many authors. The statements made are usually too broad and sweeping to be sustained by the facts observed in actual practice. I am inclined to believe that cases of acute cystitis from exposure to cold and wet do occur. It must, however, be admitted that such cases are very rare, and some that have been considered as acute idiopathic cystitis may have been but a development of acute inflammatory disease upon a pre-existing abnormal condition.

It is also possible that those who deny the existence of acute idiopathic cystitis may base their belief upon the fact that in what is called acute inflammation of the bladder all the phenomena of well-defined inflammation are not present, while others consider hyperæmia of the mucous membrane and derangement of bladder function all that is necessary to constitute cystitis. Thus the apparently different opinions that exist among authors upon this subject may arise from conflicting views as to what really constitutes inflammation.

I prefer to class this condition (of congestion, hypersecretion of mucus, abnormal exfoliation of epithelium, and irritability) among the inflammatory affections, and call it acute cystitis. Such an affection as this is met with in every-day practice, and I know of no better name for it.

With this understanding, then, I will pass to a discussion of acute cystitis.

Pathology.—As acute cystitis soon terminates in resolution, or merges gradually into chronic cystitis, I think it best to give the pathology of both diseases at once, they being, as I have already said, simply different in degree of intensity and duration.

The morbid anatomy of cystitis is the same as that of inflammation of mucous membranes in other parts of the body. In the more acute forms the membrane is swollen and relaxed, and of a bright or deep red color, from hyperæmia. The surface is partially or entirely covered with a thick, tenacious mucus. There is exfoliation of the epithelium, as shown by the partially denuded condition of the membrane, especially at the top of the rugæ, and pus and loose cells are found in the sulci between the folds.

In some instances, especially in cases of acute cystitis caused by extreme overdistention due to mechanical or other retention, there may occur a throwing off of the whole or only a part of the mucous membrane of the bladder. This is more apt to occur when the retention and overdistention are caused by various accidents of the puerperal state or during delivery. That the separation of the mucous membrane is not due to direct injury caused by the child's head or instruments carelessly used, but to the effect of overdistention, is shown by the fact that the vesical neck, which is subject to the most direct injury, seldom shows separation of its mucous membrane. That injury to the organ may predispose to separation, or even determine it when already predisposed to it by some other cause, there can be no doubt. Most of these cases of separation of the mucous membrane have occurred in women, and almost all followed delivery. The bladder which has participated in the general congestion of the pelvic organs incident to the puerperal state is in an excellent condition to allow such separation to take place.

The manner of its production is probably as follows: A woman at full term is delivered after a long and tedious labor, with or without the use of instruments, of a healthy child. The child's head or the forceps may have done violence to the urethral mucous membrane by crowding the urethra against the unyielding pubic bones. Swelling of the mucous membrane results, and retention of urine (if the patient be not relieved by the catheter) follows and persists for a varying length of time. The doctor, the nurse, and the patient herself are often led to believe, from the constant or intermittent dribbling of urine, that there is an irritable condition of that organ, with frequent urination. The truth is, that this dribbling (stillicidium) is almost a certain sign of an overfilled bladder, and if the patient be not relieved the distention will gradually increase. The organ having reached its limit of distention, or being stretched to its utmost, the pressure within is so great as to cut off the supply of blood to the submucous tissue, and thus to the mucous membrane itself. This is more readily accomplished, as the muscular fibers are pulled apart and the mucous membrane thereby allowed a certain amount of bulging, by which its blood-supply is seriously interfered with. If the distention be relieved early enough, nothing worse than an acute cystitis results; but if not relieved, partial or total death of the membrane occurs, and it is sooner or later thrown off. Although death of the membrane may not take place in every case, or in one half of the cases of overdistention, it is no argument against this method of its production. Nor yet is it an argument in favor of the idea that it is caused by instrumental violence to the body as well as the neck of the viscus; for that the latter can not be the only cause may be seen from the fact that it has occurred in the male (Liston per Barnes). It is probable that there are several causes, and that these may work together to produce the result. From the uniform exfoliation it would look, however, as if the most important cause was a uniform pressure cutting off the blood-supply, and thus causing death of the part. It is even to be conceived that where marked injury has been done the membrane by overdistention (though not sufficient in itself to cause death), too rapid relief of retention causing congestion, irritation by catheter, peculiar systemic conditions, and the intense inflammation which follows may finish the work, viz.: fully carry out the impression already made by the overdistention.

This affection is not a common one, and though cases may seldom be met I desire to lay stress upon the great importance of paying strict and individual attention to the condition of the urinary organs in pregnant and parturient women. The catheter can tell more of the condition of the patient's bladder in such cases than any nurse, and can do no harm whatever when a soft instrument is used with care.

Experiments on dogs have proved that the detachment of the membrane begins at that part of the bladder just opposite the vesical neck. At this point the membrane bulges out with a collection of blood and serum beneath it, and this bulging gradually extends to other parts. Meantime, in the bladder, the mucus poured out to shield the membrane causes the urine to decompose, and incrustations of amorphous and triple phosphates are found on the surface of the exfoliated membrane. The color of the mucous membrane is usually either a deep red, greenish red, or black, and it may come away either in pieces or as a whole. In some cases (Mr. Wells's second case, Barnes) part of the muscular as well as the mucous tissue sloughed off and came away. In Mr. Liston's case the entire mucous membrane came away through a supra-pubic opening made by that gentleman to relieve retention. This occurred in the case of a male adult.

Some of these patients have recovered, and it is believed by Schatz that the reproduction of the membrane commences at that portion of it always left at the vesical neck.

That the completion of the sloughing does not takes place until sometime after the injury is done, and that the membrane itself may block the urethra and cause further retention, is illustrated by the following case, taken from Barnes's able lecture in the "Lancet," January 2, 1875. The case was under the care of Dr. Wardell, at the Infirmary, Tunbridge Wells. "A woman was admitted with retention of urine. Fetid urine was drawn off. A fœtus of three or four months was expelled followed by its placenta. Then incontinence ensued. The urine was still offensive, and loaded with mucus. Twelve days later she was seized with great pain over the pubic region. Next morning the house surgeon was called to see her on account of excessive pain. He felt a substance being expelled, and saw a mass protruding through the meatus urinarius. This was expelled in half an hour. At the moment of expulsion the urine gushed out in great force and in large quantity. Instant relief followed, and she perfectly recovered. The substance looked as if it were the whole mucous coat of the bladder. Its inner surface was coated with gritty deposits. Its minute structure is not described." Barnes has no doubt but that the retention was in this case caused by retroversion of the gravid uterus.

One of Mr. Spencer Wells's cases, also cited by Barnes (*loc. cit.*), is very instructive: "A woman, aged 22, had a natural labor with her first child. The bladder was not emptied for sixty-two hours. Five pints of turbid, bloody urine were then drawn off. Cystitis followed, then incontinence of urine, and a train of distressing cerebral symptoms, ending in death two months after delivery. The bladder after death was found to contain a detached cast, lying loose, covered with gritty deposits of urates and phosphates. The walls of the bladder were thick and contracted, the muscular fibers being distinctly visible. The cast resembled degenerated epithelium. On boiling a piece of it in dilute acetic acid, much of the saline matter became dissolved, and some of the tissue became clear, looking like smooth muscular tissue which had begun to degenerate, as shown by the deposit of fatty or albuminous particles in its substance."

Further pathological results may follow the prolonged retention of urine. The bladder having reached a certain point where no more urine can enter it, and even before this time, the ureters are filled from the urine above, and as the renal pelves fill, both they and the ureters are put greatly on the stretch. The kidneys continue to secrete urine until the pressure in the urinary tubules equals that of the blood in the glomerulus. At that point all secretion ceases, and pressure on the emulgent veins becomes so great that degenerative changes are apt to take place. In some cases after the pressure is relieved, acute nephritis results. The urine following such a condition of distention is loaded with hyaline, granular, and epithelial casts, and epithelial elements from the kidneys.

The following case, which occurred in the practice of Dr. Geo. W. Cushing, of this city (the doctor having kindly furnished me with a report of it), may serve as an illustration of what I have been saying:

"Mrs. S., of New York, aged twenty-six; married eight years; one child; catamenia regular; appetite fair; bowels sluggish; no dysuria previous to present attack. Has been under treatment for the past two months for cervical endometritis. Local applications of mild astringents and glycerin, with injections of borax. Tonics and laxatives internally. There being some tendency to tuberculosis, she was given cod-liver oil.

"I was called to see this patient May 29, 1877. She told me she was suffering from internal hæmorrhoids, and that the rectal tenesmus was very distressing. She had had similar attacks before, and seemed to have no doubt as to what the trouble was. As she was menstruating I made no examination, but advised rest and a laxative powder, to be followed by morphia suppositories.

"May 30.—Bowels moved since last visit with considerable pain. Complained of some vesical irritation, but had passed urine. Not much relief.

"*May 31st.*—No better. An examination showed no hæmorrhoids. Menses ceased. Vaginal examination revealed a very sensitive spot, with hardening on the right side, between the rectum and vagina. Pulse and temperature slightly elevated. Vesical and rectal tenesmus, but no trouble in passing water. Made diagnosis of probable pelvic abscess. Advised poultices to the perinæum, warm applications over the abdomen, and gave anodynes. Patient much relieved by the treatment, but still having severe pelvic distress.

"*June 2d.*—Condition the same.

"*June 3d.*—Found the vesical distress increased. Her husband said that she had passed urine during the night. Was called to her in the afternoon, and found her in great suffering. Said that her husband had misinformed me, and that she had passed no urine for about thirty hours. I examined the abdomen, and found dullness well up to the umbilicus. Introducing a catheter, I drew off a large quantity of very offensive, high-colored urine, with much relief to the patient. For the next two days I was obliged to use the catheter. An examination of the urine drawn off was made, and showed the presence of renal epithelium, granular, hyaline, and epithelial casts, and considerable albumen, as also epithelium from the bladder and ureters.

"*June 5th.*—I found a tendency of the inflammatory products in the pelvis to point about the center of the perinæum, and, though not quite sure of pus, I punctured and evacuated quite a large amount of it.

"Since then the treatment has been the use of alkalies and soothing drinks—tr. ferri chloridi—and washing out the bladder with lukewarm water containing salt and a little carbolic acid. The abscess remaining open and very sluggish for some time, I put the patient under ether, and performed the operation for fistula in ano. At the present writing, October 30th, Mrs. S. is in excellent condition, having gained in flesh and strength, and being no longer troubled with the vesical disorder."

This case is not only interesting as showing the serious changes that may occur in the kidneys from vesical distention, but as illustrating the occurrence of retention of urine from reflex nervous influence. Abscesses about the rectum are especially prone to cause retention. Although in this case the mischief done to the kidneys was soon corrected, it does not follow that it will be so readily accomplished in all cases, especially if the retention continues unrelieved for any length of time.

CHRONIC CYSTITIS.

Pathology.—In chronic cystitis the redness of acute inflammation gradually gives way to a muddy gray color, the membrane being smeared in places with a dark yellow muco-purulent secretion. As the disease advances, there is excessive cell growth on the free mucous surface. Patches of ulceration appear here and there, attended with the formation of pus and occasional, though usually slight, hæmorrhages. Sometimes, at the portions destroyed by ulceration, the process of hyperplasia is established, and a polypoid material is developed. This has the appearance of exuberant granulations, as seen on a healing sore. At other times, and even in portions of the same organ in which hyperplasia occurs, the process of ulceration advances. The submucous intermuscular tissue partakes of the inflammatory trouble, and thickening of the vesical walls results. The decomposed urine, mixed with pus, mucus, blood, and shreds of membrane, forming the chocolate-colored fluid found in the advanced stages of this disease, acts as an irritant on the unhealthy membrane, and produces deeper or fresh ulceration.

In advanced cases, with deep ulceration, the muscular fibers (which resist the destructive processes longest) are occasionally seen, stretching from one side of an ulcer to the other, forming a sort of bridge. When the end of one of these fibers becomes detached, it floats like a filament in the contents of the bladder. In some cases the salts of the urine are deposited, and form incrustations on the ragged mucous membrane.

I remember that one of my patients frequently passed lumps of material that on examination proved to consist of all these products of destructive inflammation, among which were mixed deposits of the urinary salts in the form of hard, gritty particles.

In cases of long standing, the vesical ends of the ureters are obstructed by swelling and hypertrophy of the bladder-walls. This produces obstruction to the free flow of urine, and leads to dilatation of the ureters and renal pelves, and in some cases organic disease of the kidneys follows in the train of pathological sequences. I will refer to this subject again.

When the disease has destroyed the mucous membrane partially or wholly, and extends to the muscular parietes, we have what is known as interstitial cystitis, and, if the serous coat becomes involved, there is also pericystitis. This latter is simply an inflammation of that portion of the pelvic peritonæum which covers the bladder. In interstitial cystitis, after destruction of portions of the mucous membrane by ulceration, the areolar tissue beneath it and in the muscular walls gives way, the muscular fiber generally becomes thickened and burrowed by ulcerated cavities, irregular in form, and surrounded by cicatricial tissue. The extreme hypertrophy of the muscular coat found in the bladder of the male under these circumstances does not so commonly exist in that of the female.

In epi- or peri-cystitis the peritoneal coat is found to be hyperæmic and thickened by exudation, and the adhesions which follow bind together the bladder and the neighboring organs. Perforation of the peritonæum sometimes occurs, allowing infiltration of the urine. This usually develops general peritonitis or septicæmia, or both, and death almost inevitably follows.

I have already stated that the walls of the bladder, including the serous coat, may become involved by the extension of a primary inflammation of the mucous membrane. This is undoubtedly the usual mode of occurrence, but, in some cases, I think that all of the bladder coats may become inflamed at the same time, making an inflammation *in toto*. At least, it is a fact that in some cases the mucous, muscular, and serous layers of the organ in question become involved in such rapid succession as to prevent us from detecting its progress from one tissue to another.

The inflammatory process, having traversed the mucous and muscular coats, and involved the serous, especially where ulceration of the mucous membrane accompanies it, is likely to extend to the other portions of the pelvic peritonæum and cellular tissue if the patient lives sufficiently long.

It will be observed that in this condition there is about the same pathological anatomy as in pelvic peritonitis and cellulitis where inflammation of the bladder-walls is caused by, and consequently secondary to, the pelvic inflammation. In such condition the kidneys and ureters are usually found diseased. In some cases the cellular tissue about the bladder becomes greatly increased, and occasionally abscesses form, as in ordinary pelvic cellulitis.

I am satisfied that the disease described in some of the text-books as idiopathic pericystitis is, in almost all cases, when it occurs in women, a pelvic peritonitis originally, the bladder becoming affected secondarily.

One of the most serious results of intense vesical inflammation is gangrene. The bladder becomes distended from paralysis of its muscular walls, and its contents are found to be a brownish colored fluid, consisting of decomposed urine, shreds of broken-down mucous membrane, altered blood, pus, epithelial elements, and urinary salts. The mucous membrane is found to be soft, pultaceous, and altered in color, the latter varying from a deep, charred black to a dark greenish or greenish yellow.

The submucous connective-tissue layer and the muscular coat are softened, discolored, and infiltrated with malodorous pus. The peritonæum is also injected, and in places discolored, sometimes perforated, and having undergone fatty degeneration. This complication usually occurs in the course of chronic cystitis with considerable ulceration, and in which an acute inflammation is lighted up, there not being sufficient vitality left to prevent rapid and deep gangrene.

These extreme forms of cystitis are rare, and occur generally in connection with abnormal cases of labor. A pregnant woman having a cystitis of a mild form is liable to develop acute general cystitis at her confinement. Again, inflammation and gangrene of the bladder sometimes follow instrumental or manual delivery in which severe contusions of the bladder have occurred.

I desire now to call attention to some of the effects of cystitis on the ureters and kidneys. That form of vesical inflammation known as chronic cystitis may travel up the ureters to the kidneys, producing ureteritis, pyelitis, pyonephrosis, or renal abscess. This affection seems more commonly to attack the left ureter and kidney. I say *seems*, that being simply my opinion, derived from the cases that I have seen or of which I have read. I know of no statistics upon the subject. This complication is not so common in females as in males, which is owing, perhaps, to the fact that their short urethra, being, as a rule, free from stricture, and seldom obstructed otherwise for any length of time, the inflammation of the bladder has less tendency to extend, is less severe, and, as a rule, is earlier and more easily treated locally than in the male.

It can not be denied that the damming back of urine into the ureters and renal pelves is a factor in the production of disease in these parts. Suppose that an inflamed ureter becomes blocked up from any cause (a mucous, purulent, or blood plug; by the impaction of a small calculus from the kidney; thickening of its mucous membrane; or hypertrophy of the bladder-walls), the urine behind the point of obstruction greatly distends the ureter and renal pelvis, decomposes, and produces acute pyelitis, which often leads to destruction of the kidney on that side.

In post-mortem examinations of such cases it will be found that the mucous membrane of the dilated ureter and pelvis of the kidney is swollen, pulpy, and of a dirty-drab, grayish, or greenish color, and possibly with incrustations of saline matter upon its surface. The renal pelvis may be sacculated, and the pouches may contain shreds of membrane, thickened, dirty pus, and saline matter. The kidney, when free from organic lesion, is always sympathetically affected, being enlarged and congested. Abscesses of the kidney itself have been found in these cases.

The inflamed and dilated pelvis of the kidney, gradually enlarging, flattens out, and implicates the papillæ, and later the pyramids in the inflammatory process, until, finally, the whole organ is converted into a sacculated abscess.

When there is destructive inflammation of the kidney (the ureter not being obstructed, and the pus having a free exit), the organ shrinks until it is converted into a little shriveled body, weighing from a few drachms to an ounce or two. If the purulent matter has not free exit, it fills the kidney, and becomes thick and putty-like, cutting like fresh cheese. This may be the case where the purulent matter can not or does not escape from the kidney, the ureter being perfectly free throughout. The septa between the sacculi are occasionally calcified.

The pyramids alone may suffer, their tissue being converted into purulent matter, the whole having the appearance of soft putty, in some cases studded with calcareous masses. When the purulent matter is washed out, the hole left looks as though the pyramid had been punched out, so smooth and clean cut are its edges.

Again, the kidneys may be studded with minute abscesses. Where one kidney is wholly or partially destroyed, the other, if healthy, is, as a rule, largely hypertrophied.

In some cases of long standing the affected kidney does not break down into purulent matter, but by a slower process, probably that of chronic congestion, becomes granular and contracted.

The study of the renal complications of cystitis is a very interesting and instructive one, but it is too extensive to permit of anything like a full discussion here. For a more elaborate consideration of the subject, I must refer to the special books on renal diseases.

Symptomatology.—The various forms of cystitis being simply stages of the same disease, I shall speak of their symptoms all under one head.

They may, for convenience sake, be divided as follows:

1. Symptoms referable to the organ or its contents.

2. Symptoms referable to neighboring organs, that suffer either from sympathy or through direct extension.

3. Symptoms referable to various conditions of the general system, as: (*a*) The vascular system. (*b*) The digestive tract. (*c*) The cutaneous surface. (*d*) The nervous system—cephalic and subcephalic.

1. The symptoms referable to the organ itself are chiefly derangement of function—viz., pain, tenesmus, and frequent urination. The symptoms vary in severity according to the extent and intensity of the cystitis. In the mildest form of the trouble there is frequent desire to pass water, which often comes with unusual force. Micturition is followed by a desire to strain, called vesical tenesmus, as if the organ had not been fully emptied. In the more acute cases this gives rise to the most intense agony, the patient remaining on the vessel for hours at a time. The sensation of a few drops of urine remaining in the bladder may pass off in a few moments, but, as a rule, returns after each micturition.

As the disease advances, and ulcerative changes take place, this vesical tenesmus returns in full force, and the powerful squeezing together of the bladder-walls during and after urination produces intense pain. Sometimes pains shoot up into the breast or the region of the umbilicus. There is often a dull, heavy aching in the perinæum. In nearly all cases there is continuous backache, or, more correctly, sacral pain. These pains seem to be most severe in cases of long standing, where, upon an already ulcerated surface, an acute inflammation is set up by errors in diet, medicines, violence in catheterization, rapid changes in temperature, and the weather.

The condition of the urine in acute or chronic cystitis is of importance, but if reliance is placed upon it alone for a diagnosis there will be many disappointments. The specific gravity is usually low in the more chronic types, varying from 1·005 to 1·018, being usuually about 1·010. In the primary acute form the gravity is little if anything below the normal, and, if there is marked fever, may rise as high as 1·030. In acute attacks engrafted on a chronic state, the gravity is usually low. When the specific gravity is low in acute cystitis, if not dependent on the diluent drinks and diuretics given, it is probably due to a slight sympathetic hyperæmia of the kidneys. The low gravity in chronic cystitis is possibly due to the same cause, and a urine not only proportionally but really deficient in the urinary salts is excreted. To this may be attributed many of the uræmic (ammonæmic) symptoms accompanying the disease, which are supposed by many to be due to absorption of decomposed urine. That such absorption might take place after ulcerative processes had begun, or even slight epithelial erosion had taken place, there can be no doubt; but it is a question whether we are to look to the absorption from the eroded bladder as the only method of their production. I shall speak of this more fully very soon.

The reaction of the urine in acute cases, when the affection is not due to, or accompanied by, retention, is at first usually acid. If there be retention, the reaction is usually alkaline, due partly to the fixed alkali of the mucus which is present in excess, but chiefly to the ammonia disengaged in the breaking down of the urea. In chronic cystitis the reaction is almost invariably alkaline, being intensely ammoniacal.

In the primary acute form, the color is but slightly altered. The presence of a little blood may give to the urine a smoky tint, and if decomposed it will look hazy and perhaps contain sparkling crystals of the triple phosphate. In the chronic form the urine is of a pale, dirty yellow hue, and may be of a deep red from the presence of considerable blood.

The odor is ammoniacal in the acute type, if the urine be decomposed, otherwise it is normal. In the chronic form it has not only an ammoniacal but a peculiar pungent odor of flesh. This is usually known as *organic*, from the fact that it is due to the amount of organic material present.

The sediment in acute cystitis is usually mucus, sometimes pus (white and clinging to the bottom, or somewhat flocculent). It may be tinged with blood, or rendered denser and whiter from the presence of the amorphous and triple phosphates. In chronic cystitis the sediment is commonly heavy, and of a dirty brown or brownish yellow color. Flakes of pus, shreds of tissue, as well as blood and epithelial elements, cause it to vary greatly in different cases. When the intense alkalinity of the urine has rendered the pus gelatinous, the sediment is seen as a ropy mass that clings tenaciously to the bottom of the vessel when inverted, or slides about in a jelly-like mass.

Microscopically, this sediment presents a varied and interesting appearance. In the acute form numerous fibrillæ of mucus, a few pus-corpuscles, and possibly blood-globules are to be seen, and if decomposition has taken place, the amorphous and triple phosphates.

In chronic cystitis pus-corpuscles are usually present in large amount. There is also a varying amount of mucus, triple and amorphous phosphates, spheres of the urate of ammonia, organic *débris*, and in some cases epithelial elements. In the advanced stages of chronic cystitis epithelial elements of any kind are very rarely found. It is only in the earlier stages that normal and transitional forms of vesical epithelium are present. Even then dependence must not be placed upon that alone in making a differential diagnosis, lest a pyelitis may be mistaken for a cystitis, or *vice versa*; the transitional forms of epithelium from the bladder closely resembling the normal epithelium from certain other parts of the urinary tract. The return to a healthy condition is marked by the disappearance of pus; the reappearance of epithelium in the urine, first transitional, then perfect; while the products of inflammation decrease in amount and finally disappear altogether. When there is sympathetic congestion of the kidneys, small light granular and hyaline casts may be found. If organic renal disease is present, large, small, and medium-sized hyaline, light and dark granular, and pus casts will be found, as also epithelial and blood casts. In some cases, where extensive destructive change has taken place in the kidneys, no evidences are found in the urine, either during its progress or after its completion.

Upon testing the urine chemically, albumen will be found in proportion to the amount of pus or blood present. If renal disease coexist, the amount of albumen will be greatly increased. In chronic cystitis without renal disease the amount of albumen in a number of cases studied varied from one sixteenth to one fifth of the bulk of urine. There is usually a real excess of both fixed and volatile alkaline salts, as also of the earthy and alkaline phosphates and the chloride of sodium.

In the advanced stages, where there is a depraved condition of the blood, urohæmatin is present in a marked degree, and urea is either somewhat or decidedly diminished. In other cases, and at first, the urea may be present in normal amount.

2. **Symptoms Referable to Neighboring Organs.**—These are not especially marked. In some cases, with the intense vesical tenes-

mus, there may exist an irritable condition of the rectum, with some tenesmus and pain at stool.

The uterus is often congested, which causes a free leucorrhœa; subinvolution often occurs after the confinement of those who have had cystitis during pregnancy. Extension of the inflammation in extreme cases may cause metritis and pelvic cellulitis and peritonitis. The symptoms thus arising will be characteristic of the disease of the organs or tissues involved.

Menstruation may be variously disturbed; menorrhagia, metrorrhagia, or amenorrhœa resulting either from congestion, inflammatory extension, or reflex nervous influence.

Neuralgia of the uterus or ovaries may also be produced in this way. I have just said that subinvolution of the uterus is almost sure to follow a pregnancy occurring during the existence of a chronic vesical inflammation, and I am inclined to believe that the same result is produced in some cases by an acute cystitis following delivery.

Renal disturbances upon which I have already touched will be spoken of more at length hereafter.

3. **Symptoms Referable to Disturbances of the General System.**—These symptoms may be due to reflex nervous influence, or to direct blood-poisoning. For convenience sake I will first consider:

(*a*) *The Vascular System.*—Although there has been much dispute among authors as to how and by what the general poisoning is caused, there seems to be no question as to whether such a poisoning really does take place. As general systemic effects may be produced by two separate blood conditions, I will discuss the subject under two heads, prefacing their consideration, however, with the remark that, as a rule, the two conditions exist together. They are: first, abnormal ingredients existing in the blood; and, second, a poor condition of the blood itself (anæmia).

The poisoning of the general system that usually complicates cystitis of long standing may be produced in three ways, viz:

1. Organic renal disease, or renal hyperæmia (sympathetic), leading to imperfect elimination of urinary salts.

2. Direct absorption of one or more of the ingredients of the decomposed urine (ammonæmia, urinæmia).

3. Absorption of purulent or septic matter, produced by decomposition of sloughing tissue and organic *débris.*

1. Probably in almost all cases of chronic cystitis the kidneys are kept in a more or less active or passive hyperæmic state; and while eliminating a normal amount of fluid, fail to rid the blood of

the accumulating salts; and thereby a slow, steady blood and tissue poisoning is brought about. So slow is it, that the system seems to establish a certain amount of tolerance for the poison.

A French experimenter has found that a small amount of urea is daily eliminated by the mucous membrane of the bowels in health, and we know that in renal diseases, with partial or total suppression of urine, the bowels are largely concerned in the elimination of the poison from the system. In this manner may be explained the occasional attacks of vomiting and almost uncontrollable diarrhœa in bad cases of cystitis. Of course, when destructive renal disease complicates the cystitis, the general poisoning is more marked and more readily explained.

2. In the chapter on the function of the bladder I pointed out that experimenters had pretty well established the fact that a normal vesical mucous membrane was unable to absorb anything except possibly a little water, but that where erosion of the epithelial surface or ulceration existed, absorption was possible. This being the case, it will at once be seen how easy it is for a patient suffering with chronic cystitis to become poisoned by the absorption of decomposed, ammoniacal urine in the bladder. Whether the *materies morbi* be the urea, the ammonia, or all or part of the urine, is not as yet definitely settled. This form of poisoning by absorption has been denied on the ground that the urine remains but a short time in the bladder owing to the intense vesical tenesmus, and that the eroded surface is fairly well shielded from contact with the urine by mucus or gelatinous pus, and that therefore there is neither time nor opportunity for absorption. As against these arguments, let me say that of all kinds of urine, the highly limpid seems the most easily absorbed; that poisoning is not supposed to be due to the fresh urine that comes directly from the kidneys, but to its decomposing sediment, caught in the meshes of the mucus and muco-pus. Further, the intense vesical tenesmus, while keeping the bladder comparatively empty, thoroughly mixes the decomposing urine with the mucus, thus at each micturition applying freshly charged decomposing matter to the eroded and ulcerated surface. It will also be observed that in some cases where, by the use of opiates or in the course of the disease itself, the tenesmus wholly or in part abates and the urine remains in the bladder for a longer period than usual, the patient, while feeling greatly relieved by not having the incessant calls to urinate, still begins to experience a peculiar sensation of sleepiness and the other manifestations of systemic poisoning. That this is not due to the opiates or other remedies used, is evident

from the fact that as large or larger doses of the same remedies do not produce these peculiar results when given at times when the vesical tenesmus is marked. It is undoubtedly explained by the fact that the bladder has more time to absorb a part of its contents, which, when absorbed, produce these results.

3. Blood contamination due to the absorption of purulent or septic matter.—This material may be the *liquor puris*, the disintegrated corpuscles of pus, or possibly the whole corpuscles, as also the decomposed shreds of sloughed membrane and organic *débris*.

I think there is little doubt but that such material is at times absorbed, and gives rise to the peculiar septicæmic or pyæmic symptoms. The chill, fever, and sweating, with peculiar head symptoms (all to be spoken of more fully hereafter), the sudden diarrhœa, with copious black, offensive liquid stools, are probably caused in this way.

Whether the general symptoms are produced at the time of each absorption, or whether by slow degrees the poisonous material collects, and, tolerance being finally exhausted, nervous disorder, with a powerful effort at excretion by the bowels, results, we do not know.

4. Depraved blood condition — (anæmia).—In cystitis of long standing, owing to frequent hæmorrhages, poor digestion, excessive diaphoresis and diuresis, and reflex nervous influences, the blood becomes poor in red corpuscles and fibrin. Injuries on persons thus affected do not heal readily, and poor tissue renovation is a general accompaniment of this affection. Cerebral anæmia is an accompanying complication, due to the same cause, and various abnormal nervous phenomena result from poor nourishment of nerve-tissue. All the fluids and solids of the body are but poorly constructed, and imperfect performance of function necessarily results. This poor blood condition, as I have already said, is manifested by the presence of urohæmatin in the urine.

(*b*) *The Digestive Tract*—Anorexia, especially at the morning meal, is a common accompaniment of chronic cystitis. In some cases this is the only meal where the appetite does not invite the patient to partake. A longing for peculiar foods is also very common, the patient often having lost the desire before the article in question reaches her. The common symptoms of disordered digestion are usually present, and the affection may be either of the nervous type, or of the chronic catarrhal form; it is usually a mixture of both. If, as is believed, the poisonous material absorbed from the bladder and the non-eliminated urinary salts find vent through the alimentary canal, we have no trouble in discovering a cause for the catarrhal disorder. The nervous disorders are readily explained by the effects of the abnormal condition of the blood, and the broken and sleepless nights which interrupt and retard the nutrition of the nervous system.

The bowels are usually irregular and constipated, and require daily enemata to open them. This costiveness is occasionally interrupted by a profuse watery diarrhœa, which would seem to be an effort of nature to relieve the blood of its abnormal contents, as I have already said. It may last for days or for only a few hours, and the discharges are usually rich in the carbonate of ammonia. The septicæmic diarrhœa differs usually in the great prostration accompanying it, the character of the stools (black or greenish black, and very offensive, the organic odor quite or partly hiding the ammoniacal odor), and the fact that it is usually preceded or accompanied by chills, fever, and sweating. If checked too abruptly, head symptoms, mild muttering delirium, etc., are likely to follow.

The results of imperfect digestion are seen in the poor, unhealthy condition of the patient's flesh and skin, and all the signs of malnutrition present.

(*c*) *The Cutaneous Surface.*—The skin of patients with chronic cystitis is usually sallow, loose, and has a lifeless feel. Indeed, one might almost make a diagnosis from the complexion alone. Sweating of the palms of the hands and soles of the feet is common. In low states of the system the patients are especially liable to night-sweats. The perspiration sometimes has a urinous odor. I have already spoken of the septicæmic diaphoresis.

(*d*) *The Nervous System.*—I will first consider the symptoms appertaining to the brain and its function, and then to the subcephalic nervous system.

There is a peculiar brain condition, supposed by some to be caused by cerebral anæmia; others attribute it to a peculiar poison circulating in the blood. By anæmia of the brain in this connection is meant not only lack of blood in that organ, but an exceedingly impoverished condition of the blood there circulating. Those remedies that tend to lessen the amount of blood in the brain, as bromide of potassium and ergot, produce most unpleasant symptoms in these cases, such as dizziness and fainting. Medicines which act in a manner to congest the brain, if given in small doses, improve this condition, as also do the ferruginous tonics, especially iron by hydrogen. From this it would appear that this peculiar condition is due more to the amount and imperfect constitution of the blood circulating in the brain, than to the absorbed or non-eliminated urinary matter. Against this theory, however, is the fact that when the vesical tenesmus is least and the urine remains in the bladder longest, and hence the blood-poisoning is presumably the greatest, the weak and somnolent feeling is the worst. Both causes probably act to produce this condition. By some, however, this cerebral anæmia is attributed partly to the poor blood condition, but chiefly to imperfect circulation due to want of exercise. This view is supported by the fact that digitalis and exercise in the open air greatly improve these patients.

When septic complications arise and the patient becomes very low, or when the septic diarrhœa is checked too suddenly, low, muttering delirium with hallucinations commonly results. This has been alluded to before. The mind is usually markedly affected, the patients feeling "blue," morose, lacking hope, confidence, and spirit. At times, indeed, they become so despondent as to seriously contemplate suicide. The little rest that they get at night is often broken by horrible dreams and nightmare. I am now speaking of the most severe cases.

The subcephalic nervous system is seldom affected beyond occasional irregular action of the heart, chills, fever and sweating, and occasional neuralgia. Pains in the nipple, abdomen, arms, legs, hands, and feet, are by no means rare. The vesical pain has already been referred to. Of course all these symptoms that I have spoken of as accompanying cystitis, do not occur in each case, nor are the greater part of them peculiar to cystitis alone. I now pass to diagnosis.

Diagnosis.—The diagnosis of cystitis is generally easy in marked cases, but in mild attacks care is necessary to distinguish it from other conditions that cause similar symptoms.

Frequent urination occurs in many other troubles, such as prolapsus uteri, adhesions from pelvic peritonitis, with abdominal tumors, and in various neuroses. Pregnancy, also, sometimes gives rise to annoying frequency of micturition. Frequent urination from prolapsus is worse when the patient is standing or walking, and is relieved wholly, or to a great extent, by the recumbent position; while in cystitis, position makes no marked difference.

I have seen one very interesting exception to this general rule. The patient had a complete prolapsus for many years, and when in the erect position she could retain the urine for an ordinary length of time, but when she was reclining the most urgent desire to urinate came on, and she could only retain a very small quantity of urine. The cause of this I found to be inflammation of the neck of the bladder. When in the upright position the urine settled down in the dependent portion, but while recumbent the pressure came on the tender part.

In adhesions from pelvic peritonitis, abdominal tumors, and pregnancy, the desire to urinate only comes on when the bladder is partly filled, and is about the same day and night. Frequency of urination is not usually accompanied by tenesmus, except when due to cystitis. In the various forms of vesical neuroses frequent urination is very irregular, the patient at times being almost entirely free from it, and at other times very much troubled.

The frequent and painful urination of cystitis may be simulated by urethritis and other painful, irritable conditions of the urethra. The distinction can be made usually, from the fact that in urethral disease there is no vesical tenesmus, or if any, it is much less than in cystitis. There are acute pain in the act of urination, and a burning sensation in the urethra, which sometimes cause sympathetic vesical tenesmus; but when this latter passes off the bladder will tolerate distention to the fullest extent.

The urine should be carefully examined and the results as carefully considered. Implicit dependence, however, must not be placed on the condition of the urine. Acute or chronic congestion may produce considerable mucus that is sometimes mistaken for pus that has become gelatinous by the action of strong alkali. Pus may be present in the urine from suppuration of the upper urinary passages (pyonephrosis, renal abscess, and pyelitis); from abscesses of neighboring organs or tissues opening into the bladder, as in colitis and pelvic cellulitis. When there is doubt on this point, Sir Henry Thompson's method of procedure as recommended by Van Buren and Keyes for detecting the source of blood should be tried.

A differential diagnosis between cystitis and pyelitis, by means of the urine alone, is almost an impossibility, especially in the later stages of the former. Thompson's method, the endoscope, and the presence or absence of a tumor in the loins, with the general symptoms, must be the guides. No dependence can be placed on the epithelium, as transitional forms from the bladder, as already explained, are very likely to be mistaken for the normal epithelium of the renal pelves, and lead to error.

One of the difficulties that long perplexed the diagnostician was to ascertain the condition of the kidneys in cases of cystitis. The products of the cystitis made the analysis of the urine almost useless in the investigation of nephritic diseases. The first step toward clearer light on this subject was taken in washing the bladder clean of all pus and mucus, and then collecting for examination the urine first secreted after the washing. This was a great help, but was not fully satisfactory because only small quantities could be obtained at a time.

I succeeded much better in estimating the condition of the kidneys by determining the quantity of urea eliminated, and not by the presence or absence of albumin or casts. It is only necessary to remove the products of the cystitis by filtration from the specimen of urine and find out in the usual way the quantity of urea. This method of investigation gives a far more accurate idea of the state of the renal function than the finding of albumin and casts. Again, by estimating in this way the degree of impairment of function one obtains an idea of the extent of organic changes that have taken place in the kidneys. This is especially reliable if the impairment of function is persistent. There is an exceptional condition in which a diagnosis can not be made in this way, and that is when one kidney only is diseased. Then the diagnosis can not be made without the use of the ureteral catheter. In fact it is only in such cases that I need to catheterize the ureters for diagnostic purposes. In all other conditions of the kidneys a diagnosis can be made without resorting to physical exploration with the cystoscope, endoscope, or ureteral catheter.

To make a positive and reliable diagnosis, resort must be had to physical exploration of the organ. The methods of exploration are palpation, percussion, and auscultation of the abdomen; examination of all the pelvic organs by the touch and speculum; and, lastly, exploration of the bladder by the catheter, or sound.

By palpation and percussion of the abdomen tenderness and distention of the bladder may be detected, if either exists. By the same means it may be ascertained whether the bladder is contracted and its walls thickened, rigid, or relaxed.

Auscultation will possibly reveal friction sounds in cases where inflammation has extended to the serous coat, and caused roughening by exudation on the peritoneal surfaces. These may seem to be rather delicate points in examination, but in obscure cases we must avail ourselves of all the means that can give the slightest evidence.

Examination of the pelvic organs by touch will detect any disease of these organs that may either cause or complicate the cystitis. Displacements and inflammatory affections of the uterus, vagina, or rectum, pelvic peritonitis, or the products of a former attack of that disease, ovarian diseases and tumors, should be carefully sought for, and, if present, their relations to the vesical trouble carefully studied.

Cystitis produced by or producing pelvic cellulitis and peritonitis has the same symptoms as ordinary purulent vesical inflammation, plus those of well-defined pelvic inflammation. There are usually pain and tenderness of the pelvic organs, and the symptomatic fever of local inflammation.

In those cases where, from gluing together of the pelvic organs, the bladder walls are separated and kept upon the stretch, incontinence often results, sometimes overdistention with dribbling. In such cases the cystitis may be entirely secondary to the pelvic adhesions, and consequent vesical distention. The urethra should be examined with care, for some of its diseases present a natural history closely resembling that of some vesical affections.

By a careful use of the catheter or sound introduced into the bladder, the degree of tenderness of that organ can be determined, and the presence of foreign bodies, such as a stone in the bladder, can be excluded. The sound being in the bladder, the finger may be introduced into the vagina, and the posterior and inferior walls be examined as to their thickness and tenderness.

In supposed cystitis the neck of the bladder ought always to be examined with a view of detecting ulceration and fissures at that point. These fissures give rise to symptoms very closely simulating cystitis, and the differential diagnosis can only be made by the endoscope.

The endoscope affords the only means of ascertaining the exact appearance of the interior of the bladder. The extent of congestion, the degree and extent of ulceration, and other lesions can be observed in this way, and this instrument should be used in all cases where the diagnosis is doubtful, or when the case does not yield to supposed proper treatment. The chief value of the endoscope is in examining the urethra and neck of the bladder. When, by the use of this instrument, urethral disease can be excluded, the diagnosis of cystitis may be made by exclusion. If this is not satisfactory, then the bladder should be emptied, washed, and thoroughly cleaned of all inflammatory products. The catheter should be left to drain off the urine as fast as it flows into the bladder. This urine, coming almost directly from the kidneys, will show if any renal disease exists. Sometimes the bladder is too irritated to permit the presence of the catheter; then the patient should urinate as soon as there are a few drachms secreted, and, if there should be any evidence of renal disease, the diagnosis would be complete.

When from an examination of the urine or the symptoms it is impossible to tell whether disease of the kidneys complicates the vesical trouble, recourse may be had to the ophthalmoscope, by means of which renal disease, retinitis albuminurica, may often be diagnosticated.

Causation.—The cause of acute cystitis may for convenience be classed under five heads, each of which will be studied separately:

1. Direct injuries, such as blows in the vesical region, falls, fractures of the pelvic bones, violent copulation, sudden urine displacements and pressure therefrom, contusions and injuries during labor, foreign bodies, rough catheterization, and overdistention from retention of urine.
2. Abnormal urine.
3. Inflammation of adjacent organs.
4. Constitutional diseases.
5. Drugs, improper food, and the virus of gonorrhœa.

These causes also pertain to chronic cystitis, whether it begins as an acute or subacute affection.

1. **Direct Injuries.**—Blows over the vesical region, falls, and especially fracture of the pelvic bones, caused by some great force, usually produce acute inflammation of the bladder, with or without rupture of that organ. The bladder, when full, is, of course, more readily ruptured than when empty, rupture in the latter condition being almost an impossibility. This item of knowledge can be turned to practical use in traveling, either by rail or water, by remembering to frequently empty the bladder. In cystitis from severe and direct injury, even without any perceptible traumatic lesion of the mucous membrane, there is apt to be marked hæmorrhage, much greater, indeed, than in cystitis from other causes.

Sudden displacement of other pelvic organs, as the uterus, may act in two ways: First, by pressure on the bladder, or by dragging it out of place; second, by blocking the urethra by pressure. These displacements may be due to falls or blows, and it is not an uncommon occurrence for the gravid uterus to topple over by its own weight. Supposing a retroversion of the gravid uterus, the cervix would compress the urethra against the pubes, while the utero-vesical ligament would drag the upper part of the bladder downward and backward. Even after the uterus has been replaced, and the pressure on the urethra removed, with relief of the vesical overdistention, the retention is likely to persist, and overdistention recur, for by the pressure the urethra becomes much tumefied, and the muscular and elastic tissue of the vesical walls overstretched and partly paralyzed.

If the distention has been great and prolonged, there may be partial or total sloughing of the vesical mucous membrane.

In retention of urine, and consequent overdistention of the bladder during or after labor, from either injury or carelessness, acute cystitis is very apt to occur. Here injury of a serious nature may be done to the urethra by pressure against the pubic bones by the child's head, with or without the intervening soft cushion of the anterior uterine lip. This is especially the case in slow, tedious labors, where the pressure is almost continuous.

The extent to which the bladder may be distended without rupturing is quite wonderful. My friend Dr. Bodkin invited me to see a lady with him in consultation, who went without urination for four days and nights after her confinement. The bladder reached above the umbilicus, and contained about three ordinary *pots-de-chambre* full of decomposed urine, which was drawn off by the catheter. The bladder remained paralyzed for three months afterward, but finally regained its expelling power. At the time I saw her she was suffering from cystitis, brought on by the maltreatment. In justice to the medical profession I ought to say that this lady was attended in her confinement and for a time after by a member of the so-called *new school* of medicine.

The ignorant or careless use of instruments during delivery is also a cause of serious vesical inflammation. In all these cases the catheter should be used several times daily, and with great care, until the organ has regained its power, and the contused urethra fully recovered itself. I may digress here long enough to say that the soft-rubber catheter is the only one that I have used for years. The old female silver catheter is the most dangerous instrument I have ever seen. It should be discarded forever. In cases where the bladder has been perfectly healthy, and the catheter passed a number of times by way of experiment, the points of membrane with which the instrument had come in contact were abraded and congested, thus showing the danger attending the unskillful use of this instrument. If the frequent introduction of the instrument into a healthy bladder produces these results, how easily must the bladder of a pregnant woman be inflamed under such treatment, for the organ has been for a time more or less congested, and during labor perhaps severely bruised!

The question has been raised as to whether the irritation and inflammation following catheterization in some cases is not due to the introduction (during manipulation) of air, either pure or containing germs that will cause decomposition of the urine. The experiments of P. Dubelt, in which the air was injected into the bladder, show that it is perfectly harmless. Moreover, the same experimenter found that the injection of decomposing urine into the bladder did little or no harm unless the mucous surface was abraded. Whatever may be the effect of such things on a healthy bladder, I do not doubt but that the introduction of germs by means of air or a dirty catheter, decomposing urine, or the rough or too frequent use of a catheter, would produce an acute exacerbation in an organ already diseased.

The influence of decomposed or decomposing urine in producing inflammation of the bladder will be more fully spoken of again.

Forcible and excessive copulation is a decided exciting, as well as predisposing, cause of acute or subacute cystitis, and, if persisted in, a chronic inflammation of the bladder is usually the result.

Foreign bodies in the bladder, such as pieces of wood, pins, needles, hair-pins, bodkins, and the like, that are sometimes slipped in by hysterical girls and those who masturbate, excite acute inflammation if not speedily removed.

2. **Abnormal Urine.**—No known abnormality of the urine will, I think, excite acute inflammation in a perfectly healthy bladder. In a bladder, however, that is suffering from chronic congestion; in one whose walls bear deposits of tubercle; in cases where some slight degree of inflammation already exists, then abnormal urine may and does give rise to marked inflammatory trouble. As a rule, however, inflammatory vesical disease precedes urine decomposition. In cystitis following overdistention, the retained urine, being mixed with mucus thrown out by the irritated and tense mucous membrane to shield itself, rapidly decomposes, and still further aggravates the abnormal condition of the membrane.

Women, sometimes from abnormal modesty, more often from the lack of opportunity, retain their urine until the bladder is distressingly overdistended, and the urine partially decomposed. Of course this is wrong and can generally be avoided, but is nevertheless a frequent cause of disease of this organ.

Where there is considerable suppuration of the upper urinary passages (renal abscess, pyelitis, or pyonephrosis), the acid urine, loaded with pus, has, or seems to have, an irritating effect on the vesical mucous membrane, and in some instances probably lights up a cystitis, and certainly aggravates one when already existing.

Deposits of the amorphous phosphate of lime, or of the ammonio-magnesian phosphate, often greatly aggravate and render serious a previously mild cystitis, but seldom if ever produce acute inflammation in a healthy bladder. This may be said also of uric-acid gravel and other crystalline urinary sediments, they being at most only able to produce some hyperæmia of the membrane with a little excess of the mucous secretion.

Urine which is already decomposed, or decomposing, as I have already said, can produce acute cystitis only in an already diseased bladder, or in one where abrasions of the epithelial surface exist.

To show how some of these causes may combine to produce cystitis, let me take, for example, the bladder of a pregnant woman which has for some time shared congestion with the other pelvic organs. Retention and some distention of the bladder occur from some cause; a clumsy physician attempts to pass a metallic catheter, and does it roughly and rapidly, and relieves the viscus of its contents. A slight catarrh of the mucous membrane, the surface of which is somewhat abraded, ensues. By the catalytic action of the mucus present in it, the urine is rapidly decomposed. The decomposition is often aided by germs introduced with the catheter. Carbonate of ammonia, being set free from the broken-down urea, assists in alkalizing the fluid, precipitating the amorphous phosphates thereby, and forming, with the phosphate of magnesia already present, the ammonio-magnesian, or triple phosphate. The urine is further alkalized by the alkali of the mucus. The bladder-walls not having fully regained their tone, a little decomposed urine remains after each micturition, and aids in decomposing that which is next secreted, and would otherwise be normal. The mucus increases in amount, the ammonia is more rapidly set free, and the mucous membrane more and more irritated, until a true acute cystitis is set up. Such cases are of almost daily occurrence.

The decomposed urine alone, however, produced without the overdistention or without the abrasion would not have occasioned a true acute cystitis, but might possibly by slow gradations have worked up a subacute cystitis. The rule, if it may be called such, is the one that I have already given—viz., that some abnormality of the urinary organs (as catarrh) almost invariably precedes urinary decomposition.

3. **Inflammation of Adjacent Organs.**—Acute cystitis may arise from the extension of inflammation from neighboring organs, as in vaginitis, metritis, uterine and vaginal cancer, extra-uterine pregnancy, abscesses of the colon or other organs opening into the bladder, pelvic peritonitis, cellulitis, etc. Gonorrhœal inflammation of the urethra may extend to the bladder. As gonorrhœa of the female urethra is comparatively rare, such an extension is seldom seen.

When it does invade the urethra it is very apt also to extend to the bladder, and is very severe. Inflammation of the renal pelves and ureters may extend to this organ and cause cystitis, the usual course, however, being from the bladder to the ureters and the kidneys.

4. Certain diseases of the general system affect the bladder, such as the eruptive fevers. In scarlet fever, and measles especially, I have noticed that the mucous membrane of the bladder suffers, to some extent, like the mucous and tegumentary tissues elsewhere. Diseases of the heart and liver act more as predisposing causes, by producing chronic vesical congestion, than as exciting causes, and when they do produce cystitis it is usually of a low chronic type. Old age, when the *bas fond* is greatly deepened, acts more as a predisposing cause, by allowing the collection and decomposition of urine. Paraplegia and other affections of like nature, by allowing overdistention and decomposition, as a rule, produce cystitis, but of a low form.

5. **Drugs, Improper Foods, and the Virus of Gonorrhœa.**—Of all drugs, cantharides is undoubtedly the most active in producing true acute cystitis. In many cases it produces simple irritation and hyperæmia, stopping short of actual inflammation. Arsenic and turpentine also produce irritation and active hyperæmia, but seldom if ever go further.

Alcoholic beverages persisted in for a length of time act more as predisposing than as exciting causes. They may, however, produce a low grade of cystitis, or, like the medicines given above, light up an acute process in an already diseased vesical membrane. Dr. A. Jacobi has seen aggravated cases of cystitis caused by the free and long-continued use of large doses of the chlorate of potassa.

The various foods can not produce acute cystitis in a healthy bladder, but may aggravate an already diseased condition. The prohibition, therefore, of stimulating condiments, alcohol, asparagus, and onions in these diseases will at once suggest itself. I have already spoken of gonorrhœa as a cause of cystitis, and need not dwell on it here.

M. Eugene Monod ("Annales de Gynécol.," May, 1880), in discussing the question of cystitis, presents the following conclusions:

1. The urinary symptoms incident to pregnancy proceed from two different causes, to each of which there corresponds a distinct clinical group of symptoms. The first group receives its explanation from the pressure produced by the gravid uterus, which leads to retention of urine. The second is caused by vesical congestion

which results from the predisposition of the bladder to inflammation, owing to its close vascular connection with the uterus.

2. During the first weeks of utero-gestation there may occur a variety of acute cystitis which is unquestionably caused by the development of pregnancy.

3. Immediately after, or during the first weeks following normal delivery, there may arise a variety of cystitis which, owing to the time of its appearance, deserves to be called post-puerperal cystitis.

4. The anatomical relations between uterus and bladder, as well as their vascular interconnections, account for the frequency of vesical disorders accompanying many uterine maladies. Certain physiological changes of the bladder during menstruation, and at the time of the menopause, also influence the establishment of bladder troubles. Thus there is seen to exist a whole class of vesical inflammations belonging only to women, and, contrary to the generally accepted opinion, cystitis is by no means rare in women.

CHAPTER XLIII.

ORGANIC DISEASES OF THE BLADDER (CONTINUED).

TREATMENT OF CYSTITIS—CROUPOUS AND DIPHTHERITIC CYSTITIS—CYSTITIS WITH EPIDERMOID CONCRETIONS.

Cystitis requires both local and constitutional treatment, and withal it is a troublesome disease to manage, especially in its chronic form. The constitutional treatment consists, first of all, in so regulating the character of the urine that it shall be unirritating to the diseased organ. Pain and vesical tenesmus should be relieved if possible. The skin should be kept in a healthy and active condition and the bowels regular and free, in order to prevent all straining at stool and secure free action of the portal circulation. Free elimination by the skin and bowels will give the kidneys and bladder less to do. To overcome existing constipation, saline laxatives should be used. A glass of purgative mineral water, given an hour before breakfast, answers very well in most cases. Cold-water enemata are advised by good authorities.

Winckel recommends the use of saline laxatives, pushed to a point where intestinal hyperæmia is produced and maintained for a time. He believes that the blood may, in this manner, be to a certain extent diverted from the bladder; and I am of the belief that the practice is a sound one. A case of my own is of interest as showing the benefit effected (supposably) in this way. A lady had catarrh of the bladder of some months' standing, which I had been treating in the usual way, with only slight benefit. She was one day attacked with cholera morbus with serous purging and vomiting, the former almost as severe as that of Asiatic cholera. The effect, for a time was to almost suspend the action of the kidneys. When she recovered, she was delighted to find that her cystitis had left her.

Among the conditions which produce irritating urine, and hence tend to produce cystitis or to aggravate it if it already exists, are malnutrition from any cause and the strumous, gouty, and rheumatic diatheses. When either of these is present it should be treated for the general good of the patient and the indirect effect upon the bladder.

The diet of patients suffering from this disease must be carefully regulated. Milk will be found to agree excellently in most cases. In the hands of Dr. George Johnson, of England, an exclusive milk diet has cured several cases, some of great severity and long standing.

He says: " The milk may be taken cold or tepid and not more than a pint at a time, lest a large mass of curd, difficult of digestion, form and collect in the stomach. Some adults will take as much as a gallon in the twenty-four hours. With some persons the milk is found to agree better after it has been boiled, and then taken either cold or tepid. If the milk be rich in cream, and if the cream disagree, causing heartburn, headache, diarrhœa, or the symptoms of dyspepsia, the cream may be partially removed by skimming. Constipation, which is one of the most frequent and troublesome results of an exclusively milk diet, is to some extent obviated by the cream in the unskimmed milk. When the vesical irritation and catarrh have passed away, solid food may be combined with the milk, and a gradual return made to the ordinary diet."

I have tried this method of treatment in several instances with decided benefit.

I may briefly state that the bill of fare usually given consists largely of fluid foods, as milk, yolk of egg, soups, and beef essence. Lean meat in small amount, and other solid or semi-solid foods that are easily digested and nutritious, may also be allowed. The cause, whatever it may be, should be removed, if possible; and the remedies must be adapted to the stage and condition of the inflammation. In the acute stage aggravated by exposure to cold, diaphoretics should be freely used, and the patient made to rest as quietly as possible. Diuretics should be given if the urine is loaded with solid material, and the alkaline salts are to be preferred. Vichy water or flaxseed tea with citrate or nitrate of potash, will answer very well at the beginning of the treatment. In using such salines, it serves admirably to give them in an infusion of buchu in case the patient's stomach does not rebel at the taste of it. This of itself is a most valuable remedy in almost all bladder affections. Care must be taken, however, not to push diuretics too far. Sufficient to bring the urine to its normal proportions. and make it slightly alkaline if naturally acid, is all that is required.

In the early stages of acute cystitis, as well as in irritable bladder, Sidney Ringer and other authorities strongly commend the use of minim doses of tincture of cantharides repeated every hour, and even oftener, but I have not seen very good effects from its use in cystitis.

One or two leeches to the anterior vaginal wall may be tried, and hot applications to the epigastrium in acute cases. To relieve pain, opium is indicated. Dover's powder is very valuable, and may be given with ordinary doses of camphor. If there is any objection to anodynes given in this way, or if there is sympathetic rectal tenesmus, suppositories of morphia and belladonna should be used.

While I have said that opium may be used at the onset of acute cases, and to relieve the suffering in old cases that can not be cured, I must impress upon the mind the great harm that may come from the injudicious use of this drug in cystitis. It deranges the digestive organs and the secretions generally, especially that of the kidneys; and, by changing the quantitative composition of the urine, renders it irritating to the bladder.

In some cases, where frequent urination and tenesmus are very severe, owing to excessive nervous irritability, twenty-grain doses of the bromide of potassium, every four hours until relieved, act very nicely; indeed, this succeeds in cases where opiates fail entirely. Recently I have used hydrobromic acid and find that it acts even better than the bromide of potassium in some cases.

The comparatively new drug, eucalyptus globulus, is worthy of a trial in obstinate cases. From its well-marked beneficial action in albuminuria and other affections of the urinary tract, Dr. W. Anderson was led to try it in cystitis, and he reports it as decidedly useful. Dr. J. J. Mulheron, of Detroit, gives it in doses of twenty minims in subacute cystitis with good results. As this remedy has tonic, antiperiodic, and antiseptic properties, it might be especially suitable in malarious districts. An infusion for injection in cases where the urine was decomposed, would most probably give good results.

Benzoic acid is perhaps the drug that would be found most useful in the largest number of cases. It often seems to act like a specific, giving speedy and permanent relief. It may be given in about ten-grain doses, in infusion of buchu, three or four times a day. As the acid is sparingly soluble in cold water, an equal proportion of borax may be added to the mixture. To insure a perfect solution, one may prescribe the benzoate of ammonia, which in the same dose acts admirably, and is more palatable.

In the more advanced stages of the disease remedies are used for their direct effect upon the mucous membrane, and much good is obtained in this way. The drugs which have the best reputation in urethritis are employed in cystitis. Balsam of Peru and of copaiba, oil of turpentine, and tar-water are the most important of this class, and should be given in capsules in the same way as for gonorrhœa. Oil of sandal-wood is also valuable in chronic cases.

When the pain is not severe, and the urine is loaded with mucus and pus, astringents should be given. Tannin continued for a considerable time is of very great value. Decoction of uva ursi, in half-ounce doses, may also be used for this purpose. In place of these, I have employed, with occasional good effect, a mixture composed of two ounces fluid extract of buchu, one ounce tincture of conium, and one grain and a half sulphate of morphia, giving teaspoonful doses every three or four hours. When pain is not severe, the morphine should be omitted.

Dr. B. A. Segur, of this city, has used salicylate of soda in purulent cystitis, and found that the quantity of pus in the urine rapidly decreased under the use of this remedy.

Dr. Sansom, of London, found that the administration of carbolic acid and the sulpho-carbolates to animals prevented the decomposition of urine, although he could not detect any of the salt in the secretion. He gave the sulpho-carbolates, and afterward collected and preserved the urine, which after six months had not decomposed. This fact should be kept in mind, and turned to account in cases where there is a tendency to decomposition from retention or other causes.

An English physician reports, in the "Canadian Practitioner," that he has met with no case of offensive urine (intestinal-vesical fistula excepted) that ten or twenty grains of boracic acid given every three hours would not cure. All these remedies may be tried in cases that are seen early; but, when they fail, or when the acute stage of the trouble is long past before advice is sought, then local treatment must be employed. The bladder should be washed out, and medicated injections used. This every surgeon will feel competent to do, no doubt, but I must give some general directions as to the methods of manipulating, as I feel assured that much of the good which ought to come from this kind of treatment is lost, and harm done instead, by not clearly knowing how to perform this operation, which I consider both difficult and very important.

There are certain rules which ought to be carefully observed in washing out the bladder. The catheter should be sufficiently soft and flexible to be incapable of injuring the bladder or urethra; it should be surgically clean; the bladder should be emptied slowly, especially when withdrawing the last of its contents, otherwise the bladder will contract abruptly upon the catheter, and be injured thereby; instillations should be made very slowly (the bladder can not be rapidly distended without injury), and the quantity used should not be more than the patient can tolerate without pain. An ounce is sufficient, and much less will suffice if more gives pain. When the quantity which can be borne is determined, the instillation and withdrawal of that quantity can be repeated until the desired effect is obtained.

By carefully following these rules, the possible benefit of local treatment can be obtained. Neglect of these will certainly bring disfavor upon the method. Some years ago I employed a rather complicated arrangement for washing out the bladder, consisting of a reflux catheter with a fountain attachment. It was the best that I could find at that time, but I have long ago discarded it for a simpler and much better instrument. I use now a soft-rubber catheter, having attached to it a piece of rubber tubing, these being joined by a piece of glass tubing, the whole being about two feet in length. A small glass funnel is introduced into the end of the rubber tube, and this completes the instrument (Fig. 260).

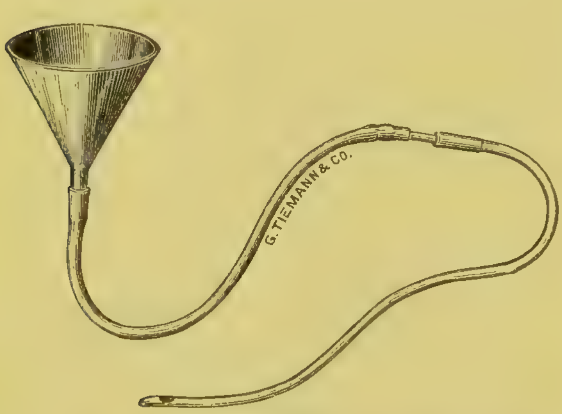

FIG. 260.—Fountain-syringe for washing bladder.

This is used as a catheter to empty the bladder of urine, and then, leaving it still in place, the washing out is accomplished by pouring the solution to be used into the funnel, and raising it high enough to make it flow into the bladder. The funnel is then lowered to permit the fluid to escape, and the process is repeated as often as may be necessary. Any desired quantity of fluid can be instilled into the bladder at any degree of pressure that may be necessary for the comfort of the patient, and the fluid can be drawn off slowly or rapidly by elevating or depressing the funnel. It is very important not to let air enter the bladder, and this can be accomplished by letting the patient retain a few drachms of urine before beginning the treatment. When the catheter is introduced, and the urine in the bladder drawn off, enough of the urine will remain in the catheter to fill it, and, by filling the funnel before elevating, the fluid used will meet the urine in the catheter and exclude the air. In case the bladder is empty, the catheter should be filled before introducing it into the urethra, and the air will be excluded in that way. When once the process of washing is begun, the exclusion of air is easily managed by regulating the elevations and depressions of the funnel, so that the catheter and tube will be kept full all the time.

This instrument fulfills all the indications perfectly, and very little practice is necessary to enable one to use it with facility. When the bladder has been thoroughly cleansed in this way of all inflammatory products, medicated applications may be made in the same manner. The quantity of fluid instilled, the length of time it is left in the bladder, and the time occupied in making the instillation and withdrawing it can all be regulated according to the will of the surgeon and the toleration of the patient.

Much care should be taken in lubricating the catheter so that it can be introduced readily. Oil has been used for this purpose. and I believe that some surgeons use it still. Castile soap and water or vaseline answers much better. The oil decomposes, and renders the catheter unclean unless great care is taken to wash and disinfect the instrument very thoroughly. In fact, it is hardly possible to keep a catheter clean for any length of time if oil is used as a lubricant. Vaseline is best, and, if that is not at hand, then soap will answer. Cleansing the catheter after use requires more than a passing notice. I have found that if a soft-rubber catheter is simply washed after use in the ordinary way—i. e., by washing it off with warm water, and then rinsing it in a mild solution of carbolic acid—say five per cent—it becomes very foul. A catheter used in that way for a few days will be found swarming with bacteria on the inside. Such an instrument is dangerous, and should never be used. In my private hospital each patient has a catheter for herself alone, and, when she is through with it, it is destroyed. After each time that a catheter is used it is well washed in hot water, and then kept in a ten-per-cent solution of carbolic acid, and once in every twenty-four hours it is kept for fifteen or twenty minutes in boiling water. With all this care the catheter can be kept clean and safe for use.

Simply washing out the bladder is often beneficial, and ought to be repeated frequently. It should always be done before using any medicated application. Warm water alone is usually employed, but the addition of chlorate of potash or common salt makes it less irritating to the bladder. I prefer borax or common table-salt, using about sixty grains to the pint of water. It is generally conceded that salt and water are more acceptable to serous and mucous membranes than any other fluid, because more like the normal secretion of these parts; but I have not found it any better, if as good, as borax. When there is ulceration or suppuration, carbolic acid and water make a most valuable wash. A drop to the drachm or thereabout is the proper proportion.

Having prepared the bladder for local applications by carefully washing it out, the material to be used may be selected from a long list of remedies. I shall mention only a few—those which I believe to be the most valuable. I need hardly say that anodynes have been tried most faithfully. The painful character of the disease suggests their use, but they are neither reliable nor very effectual. The mucous membrane of the bladder is not intended to absorb, and, therefore, very little of the anodyne effect of opium, or any of its preparations, is obtained when injected, even when the dose is very large. Should there be ulceration, then the local and constitutional effects of morphia will be produced by absorption. Braxton Hicks uses one or two grains of morphia to the ounce of water as an injection, allowing the patient to retain it as long as possible, and claims good results from its use. Remedies which produce local anæsthesia do relieve the pain to some extent, but not altogether, by any anodyne action, such as we get from opium given by the mouth or rectum. Cocaine relieves the pain for a short time, but not long. Its chief value is to benumb the parts so that curative applications may be more easily made. In some cases it acts as an irritant. Chloral hydrate is recommended to relieve the pain. I have used it in solution, ten to fifteen grains to an ounce of water, and found benefit from it.

The astringent and alterative injections most beneficial and most commonly used are nitrate of silver, sulphate of zinc, tannic acid, and acetate of lead. My rule is to use one or two grains of either to the ounce of warm water, and to increase the quantity if no good effect comes from the small doses, but to carefully avoid injections strong enough to cause much pain. Chlorate of potash is valuable, and perchloride of iron is said to be useful. Infusion of hydrastis Canadensis has been used, and great virtue is claimed for it. I have tried it, and believe that it acts well in some cases, but still it fails, like the rest, in others. When the urine is alkaline and offensive from long retention, which is occasionally the case in prolapsus of the bladder, then nitro-hydrochloric acid, of the strength of two minims to the ounce of water, should be used. Whenever pain is caused by any of these astringent injections, morphia should be used afterward, as directed by Braxton Hicks.

In obstinate cases a strong solution of nitrate of silver is one of the most reliable remedies. Twenty grains to the ounce of water has been used with great benefit, and it does not cause as much pain as might be supposed. Very small quantities only can be used at a time—not more than five or ten drops. The only trouble which I have experienced is in being sure of injecting that small quantity and no more. My favorite method of making such applications to the interior of the bladder is by instillation, as it is called. I take a glass tube of the size and shape of a No. 8 or 9 male sound, with a small rubber bulb attached to the straight end. The curved point is introduced into the solution to be used, the bulb is compressed by the thumb and finger, and then relaxed, which draws up the desired amount. The tube is then carried into the bladder, and, by again compressing the bulb, the fluid is easily deposited in the organ (Fig. 261).

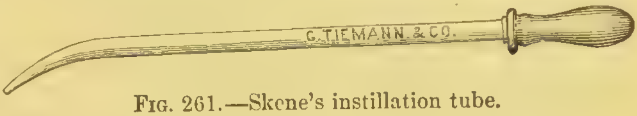

FIG. 261.—Skene's instillation tube.

If a larger quantity is to be used, it can be introduced through the instrument used for washing out the bladder. In fact, I seldom use the pipette now except for medicating the urethra.

There is one rule that should be followed in using nitrate of silver in the treatment of cystitis, which is this: If a strong solution is used, only a few drops should be employed, and, if a large injection is made, the solution should be mild. I am indebted to Prof. John W. S. Gouley for this valuable guide in the use of this remedy.

Normal urine has been highly recommended as an injection in cystitis. The urine from a healthy person is obtained and used in the same way as the other injections described. I have always looked upon this treatment with a little suspicion. It may be of value in cases where from some derangement of the general system the urine secreted is abnormal, and therefore irritating to the bladder, and where constitutional treatment can not remove that condition. When the urine secreted can be kept in a normal state, it must, it seems to me, be as acceptable to the bladder as the same kind of urine from another person. Theoretically, one would expect that healthy urine poured into the bladder from the kidneys would be more likely to cure cystitis than if it were injected through the urethra. However, this method may be of value; but one thing is certain—it fails like all other injections in certain cases.

Iodoform has been used locally in cystitis, and with good effect; but I regret to say that I have not used it enough to test its merits fully.

One great obstacle often met with in using instillations is a tender or inflamed urethra. This difficulty I have recently been able to overcome by using cocaine. It is applied as follows: I take a pipette like the one described above but larger, fill it with cocaine solution, and introducing the tapering part of it into the meatus, force the solution along the urethra and into the bladder. This often makes the rest of the treatment easy.

Another direct method of treating the bladder has been employed by Dr. Robert Newman, of New York, who has made some useful contributions to the therapeutics of vesical disease. He employs the endoscope of Desormeaux to make the diagnosis, and makes direct applications to the diseased parts through that instrument. In ulceration, he has been very successful in his practice. He applies a solution of the nitrate of silver (twenty grains to the drachm of water) to the ulcerated surface, and by carefully regulating the amount, finds that the pain is less than when a weaker solution is used in the ordinary way. I have done the same thing with greater facility by using the endoscope which I have described. The instrument is introduced, and the ulcerated part found; the glass tube is drawn out, and the application made directly to the diseased part, through the rubber speculum. Forcible and extreme dilatation of the urethra has been advocated in the treatment of cystitis by many surgeons otherwise well informed. Within the past few years the medical journals have contained the histories of many cases of cystitis said to have been cured by this operation. This is all quite erroneous. Cystitis can no more be cured by dilating the urethra than could a gastritis be cured by dilating the sphincter ani. It is a fact that if the urethra be destroyed by overdistention, incontinence will follow, and the perfect drainage of the bladder may cure the inflammation; but verily the cure is worse than the disease. I am sure that the mistake in regard to the value of this operation in cystitis comes from its having been practiced in cases of acute cystitis which would have ended in recovery without any surgical treatment, and again in cases of inflammation of the upper third of the urethra which have been mistaken for cystitis. On the one hand the operation gets the credit of curing a disease which cured itself, and on the other of curing a disease which did not exist. It will be observed that in the cases which I give at the close of this section, the urethra was dilated with no benefit, and to these I could add many others which were treated in the same way with a like result.

All the means of treatment yet described will fail in some of the worst cases of chronic cystitis. Indeed, this has led to the last resort, as I look upon it, namely, cystotomy for the establishment of vesico-vaginal fistula to drain the bladder and set it at rest. The perfect rest obtained by the urine flowing out through the fistula as soon as it enters from the ureters places the inflamed surfaces in a condition to recover, and the patient is relieved from the constant pain and the torments of urinating every few minutes night and day.

This is certainly a great triumph, and is especially applicable in cases that are incurable by all other means. Indeed, it is adapted to cases which are incurable by this operation, because it gives relief from pain, and makes the last days of an incurable sufferer tolerable. Dr. Willard Parker, I believe, was the first to do cystotomy for the cure of cystitis in the male, and Dr. T. A. Emmet adopted the operation, and has practiced it extensively among his female patients. In fact, he has become a zealous advocate of this method of treating cystitis. In his book on gynecology, in speaking of cystitis in women, he says that our management of this affection is limited to one procedure, and that is vaginal cystotomy.

Such a dogmatical statement is quite in opposition to facts well known to many in the profession. Drainage by vesico-vaginal fistula is neither the surest, safest, nor simplest method of treating cystitis in women, but only one method to be employed in those rare cases which do not yield readily to other means.

While writing on this subject some years ago, I obtained from one of the resident surgeons of the Woman's Hospital the statement that cystotomy was performed for the relief of cystitis on seventeen cases in that institution, and that four were cured and thirteen improved. This shows about twenty-four per cent of recoveries, and this I stated in my book on "Diseases of the Bladder." Dr. Emmet in his book on gynecology objects to this statement of mine as not being in accordance with a published report of the Woman's Hospital. The report referred to was not published at the time that I prepared my manuscript, nor did I see it until after my book was published. I presumed that the interne of the hospital gave me a correct report, but be that as it may, Dr. Emmet's own statistics (as given in his book, page 788) of the hospital practice are less favorable to cystotomy for the cure of cystitis than those quoted by me. They show but about twenty per cent of recoveries, whereas my statement obtained from the interne was twenty-four per cent. This shows that if I made a mistake it was in favor of the operation; or else if I was correctly informed of the results of that operation at that time, then the subsequent hospital experience of Dr. Emmet has been more unsatisfactory. Dr. Emmet's method of making the fistulous opening is by dividing the vesico-vaginal septum with the scissors, and then introducing a glass tube to keep the opening from closing. This is the most difficult way of operating and the most painful to the patient afterward. The wearing of this tube has been a torture to those that I have seen using it. There are two other methods of operating. One is to make the opening, and then stitch the mucous membrane of the bladder to the mucous membrane of the vagina, thus preventing the closing of the opening, and at the same time enabling the edges of the wound to heal in a short time, a great gain in itself. The other method is to make the opening with the galvano- or thermo-cautery. Dr. M. A. Pallen was the first to operate with the thermo-cautery. This is what he says about it: "The main difficulty hitherto has been to keep the incision open after the use of the scissors or knife. Artificial means must be resorted to, such as an India-rubber tube passed from the urethra through the opening, which is annoying and painful; or a glass button introduced, which is difficult to retain, and when retained is apt to beget vesical tenesmus. I believe that the use of the actual cautery at a red heat will be found to answer all purposes. If the platinum tip is at a white heat it cuts through too rapidly, and we are apt to have as much hæmorrhage as with the knife or scissors. Hæmorrhage is sometimes quite serious after incision of the vesico-vaginal septum, particularly if the scissors or knife strike the tortuous, enlarged veins, often ramifying upon or under the mucous membrane of the bladder. If the platinum tip of the cautery be heated to a white heat, it cuts through as rapidly as the knife, and therefore the hæmorrhage is to be expected; besides, the thin pellicle of slough following the white-heat tip soon peels off, and union might ensue. To avoid both bleeding and contraction, the red-heat tip should be slowly passed along the site of the proposed opening, dividing first the mucous membrane of the vagina, and then resting for a moment or so to allow the adjacent vessels to contract and become thrombotic. The submucous connective tissue is then burned, and afterward the bladder-wall itself. Extreme delicacy of manipulation is required upon the part of the surgeon, lest he burn directly into the cavity of the bladder, which should be avoided if he wants to make sure of a result that will prevent hæmorrhage, contraction, and subsequent union.

"The care after an operation of this kind consists in daily cleansing the bladder thoroughly with demulcent warm fluids, such as starch or flaxseed water. The pain in the bladder following the burning is comparatively slight, and usually subsides within thirty-six or forty-eight hours."

Dr. John Byrne, of Brooklyn, operates in a very easy and satisfactory manner. He has a forceps, one blade of which is introduced into the bladder and the other into the vagina to grasp the vesico-vaginal septum. The blade in the vagina is fenestrated and the blade in the bladder is grooved. The thermo-cautery knife is introduced through the fenestrum of the forceps and the septum is divided, the knife being guided by the forceps.

This method makes the operation simple and easy, and the after treatment is also greatly simplified.

One serious drawback to cystotomy is the incontinence which keeps the patient in such an uncomfortable state by the constant trickling of urine from the fistula. I tried to obviate this trouble to some extent by using a hollow-globe pessary, made of hard rubber, with a tube attached to it. The globe is perforated with numerous small holes all around, except for about half an inch from where the tube begins. The globe is introduced into the vagina, and the tube projects through the introitus. The urine collects in the globe, and escapes through the tube; and by attaching a piece of flexible tubing to it the urine can be conveyed into a vessel. When the introitus vulvæ is small and the sphincter vaginæ perfect, this answers very well, especially during the night, when the patient is in the horizontal position. When worn during the day, it is necessary to have a rubber bag attached to the leg of the patient to act as a receptacle.

Encouraged by my success with the globe-pessary, I had another made, shown in Fig. 262. It is the ordinary Smith's pessary, with an oblong cup on the upper anterior portion of it, which fits over the fistula, and collects the urine and guides it out to a urinal. In artificial fistula, made in the center of the vagina, this pessary answers a most valuable purpose.

I was led to devise this way of relieving patients with vesico-vaginal fistulæ by having one under my care who was in no condition to be operated on

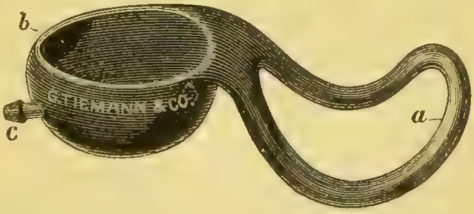

FIG. 262.—Skene's urinal cup-pessary. *a*, represents the posterior portion which surrounds the cervix uteri; *b*, the cup; and *c*, the tube which conveys the urine from the cup to the urinal.

for the cure of fistula, owing to general ill-health. She also had severe vulvitis, and the urine constantly passing over the inflamed surface drove her almost insane. Her suffering was terrible; so to relieve her until I could operate I had made the perforated stem globe-pessary, or whatever one may see fit to call it.

I come now to what I believe to be another important part of the treatment of these obstinate cases. I allude to drainage by means of the self-retaining catheter. Years ago I had a very troublesome case of cystitis, which I faithfully tried to relieve by all the means at my command, but without success. My patient was obliged to urinate every fifteen or twenty minutes, day and night, and the pain and want of rest were fast wearing her out. In the hope of securing rest at night I introduced a Sims's self-retaining catheter with a rubber tube attached, to convey the water to the urinal. The result was very gratifying. She could sleep well, and gained in health and strength rapidly, and the cystitis gradually improved. Since that time I have resorted to drainage by catheter in cases which resisted the ordinary treatment.

A description of this plan of treatment will be found in the "Proceedings of the New York Obstetrical Society," recorded in the "American Journal of Obstetrics," for February, 1874. This method has been successfully practiced by Hunter McGuire, a complete history of his case being published in the "Richmond and Louisville Medical Journal" for June, 1874. Dr. McGuire took a piece of tubing about twelve inches long, and made holes in about four inches of the end of it with a shoemaker's punch. He passed a silver tube into the bladder, and then pushed the gum tube through it until the perforated four inches were coiled in the bladder. This was retained in place by tapes fixed to the tube and to a bandage passed around the patient's body. The tube became obstructed by mucus, but was easily cleared by injecting warm water through it. But this long piece of tubing being frequently expelled by the bladder, the doctor tried a shorter piece, and found it was more readily retained. The patient after a time went about and attended to her household duties while wearing the tube, and in about four months made a perfect recovery.

This method of drainage is an improvement on Sims's catheter, but still is not all that we require. Since my first case I have found that a good self-retaining catheter for this purpose is Holt's, made of perfectly flexible rubber, and, in place of an eye in the point, is cut into strips near the end, and made to spread out like an umbrella (Fig. 263).

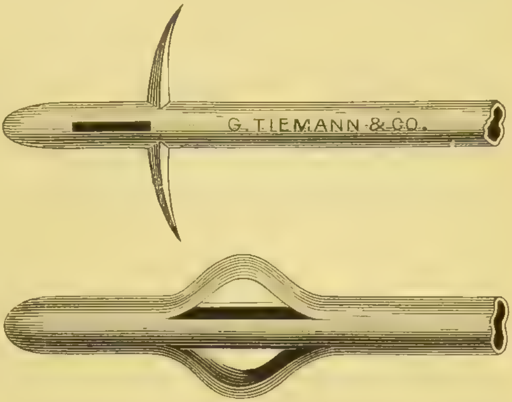

FIG. 263.—Holt's catheter, with its modification.

Another instrument for drainage is a catheter devised by Prof. Goodman, and described in the "Richmond and Louisville Medical Journal," for February, 1869, as being used in the treatment of vesico-vaginal fistula, and I have recently learned that he has used it for years in treating cystitis. The following is Dr. Goodman's description of his catheter: "It is about two inches in length, and bent to correspond to the curvature of the urethra; at the lower or external end there is a button ten sixteenths of an inch in diameter, and at the other, or external, end a shouldered, cup-shaped expansion, varying from five sixteenths to seven sixteenths of an inch in diameter, and beveled on the convex aspect of the instrument, in order to make it easier of introduction, and perforated with a number of small holes. The stem, intervening between these two portions, is one and one half inch in length, a quarter of an inch in diameter, with as large a bore as is compatible with the requisite strength. This catheter is self-retaining in all positions of the patient; first, by reason of the bulb at its upper extremity, which passes beyond the urethra into the bladder; second, on account of its curved shape; and third, in consequence of the button being overlapped and grasped, as it were, by the vulva. At the lower end there is a slight projection, or knob, over which an India-rubber tube may be slipped, this being inserted into a bottle at night, or into a urinal when the patient is up; her person may thus be kept perfectly clean." I like this instrument for the purpose of draining the bladder, when the patient can tolerate it; but I believe that the sharp point of the conical end which rests in the bladder is objectionable, and I can see no good reason for having it so. I had the point made larger and rounder (Fig. 248), and found that it answered certainly as well, and was easier to introduce.

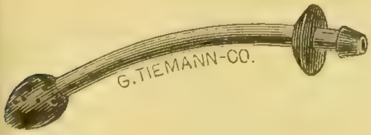

FIG. 264.—Skene's modification of Goodman's self-retaining catheter.

In drainage by any method it must be remembered that the instrument should be frequently removed and cleaned, and the bladder occasionally be washed out at the same time.

Fortunate it is that we have this method of treatment now at our command. By this means we can restore to health and comfort many of those cases which have hitherto been considered hopeless.

I believe that a normal condition of the urethra is a prerequisite to drainage. When there is tenderness of the urethra, the patient can not tolerate the catheter; this form of treatment would be more popular if this point had not been overlooked.

Where there is hæmorrhage into the bladder, the rules already given are to be followed.

In cases of exfoliation of the whole or a part of the mucous membrane of the bladder, and the organ is evidently trying to expel its contents, the urethra should be sufficiently dilated to allow the mass to pass, or it may be removed by the forceps, if this can be done without force. After its extraction antiseptic and disinfectant measures should be resorted to. Injections of lime-water, weak solutions of carbolic acid or salicylic acid should be used, and the organ washed out once or twice daily with warm water. Above all, urine should not be permitted to remain in the tender organ for any length of time.

In passing the catheter, especially in cases where the bladder is bound to neighboring organs, care should be taken to let no air enter, for Winckel has seen vesical catarrh follow its introduction, and makes it a point, even after using Rutenberg's apparatus, to wash out the organ with some antiseptic.

Prognosis.—In acute cystitis occurring in a healthy subject the outlook is good, recovery being usually attained in from one to three weeks. When occurring in the course of pregnancy, or after delivery, the prognosis is not so good, there being a tendency for the disease to become chronic, and, even if cured, it leaves a weak state of the organ afterward. The prognosis in diphtheritic and croupous cystitis depends mainly on the systemic disorder, and is, therefore, grave.

When due to displacements of the gravid uterus, the prognosis will, of course, depend on the ability to replace the womb. In cancer of the womb, vagina, anterior vaginal wall, or of the bladder itself, the prognosis is the same as in malignant disease generally. In chronic cystitis, with ulceration, the prognosis is very serious; for, with the tendency to hæmorrhage, extension to the peritonæum, perforation, blood-poisoning, with low systemic condition, extension to the renal pelves, and destruction of one or both kidneys, a fatal termination comes sooner or later, and may come when we least expect it.

About one half of the cases of exfoliation of the vesical mucous membrane have recovered. Gangrenous inflammation, involving, as it usually does, all the coats of the bladder, is the most speedily and certainly fatal of all the forms of cystitis.

Hygiene.—There are certain points to be considered in the management of all cases where, from certain circumstances, vesical disease is to be expected, and also where it already exists.

In pregnant women, where the pelvic organs are constantly tending to congestion, attention should be given to the patient's circulation; friction to the legs, feet, and arms; daily warm baths; moderate exercise, alternated with periods of rest in the recumbent position, and astringent or saline vaginal injections should be employed. Upon the least suspicion of malposition of the uterus, that organ should be examined, and, if malposed, replaced. The diet should be bland and unirritating, yet nourishing, and any indigestion corrected as speedily as possible. An occasional saline laxative will prove of use when there is constipation. Tonics will be found serviceable in some instances.

In women not pregnant, where there is a tendency to vesical disease, the same plan should be followed, with the addition of injections of water, as hot as can be borne, into the vagina every night, as recommended by Dr. Emmet. Not less than a gallon should be used. Where from any cause retention exists, or there is a tendency thereto, the urine should be drawn carefully with a soft catheter, well soaped, being sure that the catheter is *perfectly* clean, and that no air is permitted to enter the viscus for the reasons already given. Winckel believes that in every institution for lying-in women each patient should either have a new catheter assigned to her, or one rendered absolutely clean by some efficient chemical process. To the enforcement of this rule Winckel attributes the great exemption from vesical inflammation enjoyed by the patients in the Dresden House for Child-bearing Women.

I must fully indorse the teaching of this great authority. I have seen so much bladder trouble brought on by the careless use of foul catheters that I have come to look upon clumsy operators and unclean instruments as the most common causes of cystitis.

In weakness of the detrusor vesicæ (which is not an uncommon affection in pregnant women), Winckel has achieved great success with injections of simple warm or medicated water into the bladder.

In irritable bladder, with a tendency to congestion, a solution of borax may be injected with good results

Every woman, even at the risk of disturbing company or neglecting important duties, should evacuate the bladder regularly, and never long resist the desire to urinate.

ILLUSTRATIVE CASES.

Chronic Cystitis with Intermittent Drainage; Death from Perforation of the Bladder.—The patient was under my care from November 9, 1869, to February 10, 1870, while suffering from a cystitis, which began after one of her confinements several years before. At that time she had a well-marked cystitis of the purulent variety. She was treated by injections—the method in vogue at that time—with some benefit. I also employed drainage part of the time by introducing a catheter in the evening, and letting it remain all night. This gave her great relief, and permitted her to sleep—a blessing which she had not enjoyed for several years. She was improving in her general health, although her local disease remained about the same, or at least only a little improved. She expected to return for further treatment, but, her husband becoming paralyzed, she was obliged to give up the care of herself to look after her family. From that time up to July, 1882, she continued to suffer tortures during the day, while she was obliged to be up and around attending to her household duties. At night she obtained relief by wearing the catheter, which she had continued to use ever since she was taught to do so, twelve years before. Her sufferings were almost beyond description, but, having an iron constitution and extraordinary will-power, she managed to live until the summer of 1882. During June and July of that year she failed more rapidly. Having heard of dilatation of the urethra as a cure for cystitis, she urged her physician to try that operation. He did so, and repeated the operation one week later. The only effect of this treatment (as stated in the notes of her history, which I obtained) was to reduce the number of evacuations from one hundred and sixty to one hundred in twenty-four hours. Her physician then injected her bladder in the hope of relieving the inflammation and also overcoming the contraction, which was very marked. Immediately after the first and only injection she was seized with violent abdominal pains, and rapidly developed a peritonitis, which proved fatal on the second day.

On post-mortem it was found that the bladder was adherent to all the viscera around it, the result, no doubt, of a former pericystitis. Upon the posterior wall of the bladder, and directly opposite the urethra, there was a nipple-like projection outward, with an opening at its apex large enough to admit a lead-pencil. This protuberance had been produced by the long use of the hard catheter.

The instrument had worn through the inner walls of the bladder until the parts had become less resistant; it then pushed the remaining muscular tissue and peritonæum outward, and formed the nipple-like projection. At the time of the fatal attack, the catheter had made its way through all the coats of the bladder except the thickened peritonæum. The rupture of the peritonæum was caused by the injection. That was the belief of the physician in attendance, and the history points definitely to the same conclusion. The bladder was firmly contracted and indistensible; its retaining capacity did not exceed half an ounce. The muscular wall was over half an inch thick; the mucous membrane was entirely destroyed by the inflammation.

Purulent Cystitis; Recovery after Two Years' Treatment.—This patient was a lady possessing a remarkably good organization. She was married, and had one child. Her age was thirty when her illness began. While riding horseback she was thrown off, and sustained some apparently slight injuries. Her health up to this time had been very good, but from the time of her accident—September, 1878—she had symptoms of cystitis. She was residing in the far West at the time of the accident, and, as I did not see her for several years after, and have not been able to correspond with the surgeon who then attended her, I do not know the relation which the injury sustained at that time bears to the development of the cystitis. I only know that the one followed the other immediately. The cystitis persisted, and the constitutional symptoms increased from time to time. She then returned from the West to New England to be under the care of her father, who is a physician of known ability and large experience. He gave her every attention, and placed her in the care of a neighboring physician, who has a high reputation as a gynecologist. Without giving full details of her treatment at that time, I may fairly state, upon information received from her father and her physician, that all the recognized means of treatment were tried, including complete dilatation of the urethra on two occasions. The cystitis was not at all relieved by the treatment, and the constitutional symptoms increased continuously, until she became confined to bed. Having a highly sensitive nervous system, she suffered greatly from want of sleep and the constant pain of cystic tenesmus. I first saw her in consultation about a year from the time when she was first taken ill. It was then that this much of her history was obtained. She continued under treatment for six months longer, and, at the end of that time, she consulted one of the best known and most worthy authorities in New York. He advised cystotomy and drainage for six months or longer, stating at the same time that, in view of the failure of her former treatment to give relief, there was nothing else left to be done. She declined to submit to the operation at that time. Her father sent her to me about two and a half years later. At that time she was obliged to urinate about every hour, night and day. She suffered from constant tenesmus, and her nervous system was greatly debilitated. Dr. McCorkle examined the urine for me, and found that it contained a large quantity of pus, and that there was a remarkable absence of epithelial cells. The doctor's report was that the specimen was pus, containing a small quantity of urine, and evidently came from a bladder which had entirely lost the upper layer of its mucous membrane. The diagnosis then made was chronic purulent cystitis. It appeared to me that the case was one which called for cystotomy; but, knowing the objection of the patient to that operation, treatment was undertaken, and the results soon gave some slight encouragement. The constitutional treatment was at first chiefly tonic in character, and subsequently she took saline waters, lithia waters, bromide of lithia, and, finally, buchu, benzoin, tar, turpentine, and the like. These last preparations, however, did not help her, and were not long continued. The local treatment was at first instillations of a warm solution of borax. Half an ounce was instilled at a time, and repeated until from eight to twelve ounces were used at each treatment. The instillations were always made with very low pressure. As the sensitiveness of the parts diminished, the quantity used was increased up to one ounce, but never beyond that. Three months of this treatment showed improvement. There was less pain, and the patient's general health had improved considerably. About this time nitrate of silver was used, and, later, sulphate of zinc in solution of various degrees of strength, but this always caused pain. Indeed, the suffering caused by this kind of treatment was great, and the benefit which followed being very little, it was given up. I then began to use instillations of an infusion of hydrastis Canadensis, containing a small quantity of salicylate of soda, which was used to prevent decomposition of the infusion. I am now satisfied that the salicylate was of value in its effect upon the suppurating mucous membrane. The hydrastis was very faithfully used, first by myself, and subsequently by the patient, who made the instillations with unusual intelligence and care. The result was a gradual diminution of the pain and lessening of the frequency of urination. The pus diminished in quantity, and simultaneously young epithelial cells appeared in the urine, and increased in number as the pus diminished. At the end of one year of treatment the local and constitutional symptoms had all disappeared. The urine was normal, and the patient had fully recovered, excepting that she was obliged to urinate about every four hours. This was owing to contraction of the bladder. To overcome this, gradual distention was practiced. The patient was directed to retain her urine until discomfort, not pain, was felt. Injections were used, each time distending the bladder a trifle more, always stopping short of causing pain. About two years from the time she first came under my care she was perfectly cured of the cystitis, and had regained her normal retaining power. Four more years have passed, and there is not the slightest evidence of any return of the former affection.

Cystitis treated by Cystotomy without Benefit.—This lady, thirty-four years of age, is married, and had four children. She is said to have had retroversion of the uterus, which was held in its abnormal position by adhesions. She was treated for this displacement in the Woman's Hospital of New York, so she said, and, while under treatment, a cystitis was developed, which continued until I saw her. After leaving the hospital, she became pregnant, and her sufferings increased. Two years ago, when her last child was four weeks old, she consulted a physician here in Brooklyn, who advised cystotomy, and soon after he performed the operation, using the cautery. She experienced some relief from the operation, but she still suffered very acutely. Being led to hope that in time the operation would cure her, she bore her afflictions for nearly a year, when she consulted me on the 5th of September, 1881. I then found her to have the tubercular diathesis, rather well marked, but there was no apparent disease of the lungs at that time. The vesico-vaginal fistula made by the operation was large enough to admit the little finger, and the drainage of the bladder was quite complete. Yet, strange to say, she had constant pain in the bladder, and a desire to urinate. These symptoms I found to be due to inflammation and ulceration of the urethra and bladder below the fistula. The disease at this location caused pain and irritation, which provoked reflex action, such as that which arises from the presence of urine in the bladder, but in a much greater degree. General tonic treatment was advised, and local treatment employed to relieve the inflammation of the urethra and neck of the bladder. Locally, she improved slowly. The pain and vesical tenesmus subsided almost wholly, but she has not yet recovered completely. My object was to cure the local disease, and then close the fistula. This I shall never be able to do. While the local disease is improving, she is developing phthisis pulmonalis, which precludes all thought of operating to close the fistula. The facts in this history, which I trust will be borne in mind, are, that this patient was of a tubercular organization; that cystotomy did not cure her cystitis and urethritis, nor relieve her suffering to any marked extent.

Cystotomy for the Cure of Cystitis without Benefit; Death from Phthisis following Pneumonia contracted while under Treatment.—Six years ago I had a case of cystitis under observation, which illustrates the same facts in pathology and therapeutics as in the case just related.

I shall give a very brief outline of the history simply to show the result obtained by another method of doing the same operation. This patient was a married woman, who had several children. She was of a highly nervous temperament, and came from a tubercular family. She consulted me for cystitis, the cause of which is not recorded in her history. I treated her with injections for several months without benefit. I also dilated her urethra, with the same result. In fact, I believe she rather grew worse, in place of better, while under my care. Her general health failed noticeably at any rate, and she gave signs of a tubercular deposit going on in her lungs. Her friends urged her to enter the Woman's Hospital in New York. She did so, and was under the care of Dr. Emmet, who performed cystotomy, which he did by incision and keeping the fistula open, first by his glass tube, and afterward by dilatation with the finger. After the operation, she had an attack of pneumonia—at least, she told me this when she returned from hospital. Upon her return home, I found that she had been much relieved of her most urgent symptoms by the operation. Still, there was cystitis remaining, and she had vesical pain and tenesmus. The tubercular disease of the lungs had progressed rapidly, and that portion of her lung which was involved in the pneumonia never cleared up. Her strength rapidly failed, and she died before the cystitis subsided.

CROUPOUS AND DIPHTHERITIC CYSTITIS.

Croupous and diphtheritic diseases of the bladder are very rare, and therefore require but a brief notice here. From the difficulties that have existed in the detection of the exact pathological conditions in diseases of the bladder, we may presume that mild attacks of these affections have been overlooked or not correctly diagnosticated. But, even granting this, we are compelled, from the few recorded cases, to believe that croup and diphtheria of the bladder seldom occur.

What little exact knowledge we possess on this subject has been obtained to a great extent from post-mortem examinations, and from this statement it will be inferred and correctly too, that these diseases, especially diphtheria, tend to end fatally.

From the names employed one would naturally suppose that these affections were exactly the same as the diseases of the mucous membrane of the air-passages, known as croup and diphtheria. Be that as it may, it will suffice for my present purpose to have it understood that in these diseases of the bladder there is developed an exudation or membrane like of that of croup or diphtheria.

The pathology of the local lesion in these two diseases differs only in the depth of tissue involved and in the character of the membranous formation. Thus in croupous cystitis, the false membrane, while moderately adherent, is usually on the surface, covers the whole or most of the mucous membrane of the bladder, and sometimes portions of the outer genitals, and is fibro-epithelial in structure.

The diphtheritic membrane, on the contrary, dips deeply into the mucous membrane of the bladder, exists usually in scattered patches, and is denser and more fibrous in character, its interstices being filled with little rounded cells and some fatty and granular matter.

Exfoliation of the affected portions of the vesical mucous membrane usually results from this diphtheritic inflammation, as in the analogous affection in the throat. When the membrane comes away, ulcers of varying size and depth are left to mark its former site. The destructive processes are not alone confined to the mucous and submucous tissues, but in some cases involve the muscular coat of the organ. The whole vesical surface, not covered with the membranous exudate, is of a deep-red color, and in some places ecchymotic, especially about the exudation. The inflammation is truly acute, and passes rapidly from the stage of mucous exudation to that of epithelial exfoliation and pus formation.

Symptomatology.—The symptoms in no way differ from those of acute cystitis, save that as a rule they are more intense and the constitutional symptoms are more severe. The nervous system is usually profoundly affected. There is pain before, during, and after micturition—pain that may be purely local, felt in the outer genitals, or radiate in all directions.

When the shreds of broken-down membrane separate, they may block up the urethra, and cause retention and decomposition of urine. Retention, however, may be produced at any time by intense inflammatory tumefaction of the urethra, which is often involved.

This exfoliation of false membrane must not be confounded with the sloughing of the mucous membrane of the bladder caused by pressure from overdistention or very severe inflammation.

As the symptomatology of these diseases is very much the same as those of acute and chronic cystitis, it may be best not to enlarge upon them here, as that would involve much useless repetition.

Diagnosis.—Microscopical examination of the urine, but more especially of the tissue shreds, will afford much reliable information. When a membrane is found consisting of fibrillæ interspersed with numerous small nucleated cells, having undergone fatty degeneration, and involving the superficial mucous or muscular layer, the case may be set down as one of diphtheritic cystitis. The urine rarely affords any positive information; and really it is useless to attempt to make a differential diagnosis between these diseases and ordinary cystitis in which there is much destruction of tissue.

Thus far I have had no opportunity of examining croupous or diphtheritic disease of the bladder with the endoscope, and can not say how much information could be obtained in this way. I presume that much could be gained by this instrument, and I base this opinion upon the examination of several cases of catarrhal and croupous inflammation of the rectum. In these cases the distinction between catarrh and croup could be easily and positively made by the endoscopic appearances, and I believe that what has been done in determining rectal disease could be accomplished in diseases of the bladder.

In these cases the vesical walls are very fragile, and this should be borne in mind in using either catheter or endoscope. This condition would preclude the distention of the bladder with air and examination with Rutenberg's apparatus.

Prognosis.—This is very grave indeed.

Treatment.—This, in brief, is to keep the patient perfectly quiet, to let the diet be the most sustaining, the drinks free and bland, and to keep the bladder pretty well emptied, to allay the pain and spasm by the judicious exhibition of narcotics, preferably by the vagina, in suppository. The bladder should be washed out daily with warm water, containing a little of Labarraque's solution or a little carbolic acid. Much relief of both pain and spasm will thus be afforded, even when the inflammation is at its highest.

Tissue shreds should be removed as soon as their presence is ascertained.

CYSTITIS WITH EPIDERMOID CONCRETIONS.

This is a very rare affection of the bladder, and I only mention it as a pathological curiosity. Rokitansky supposes it to be due to, or a sequence of, chronic cystitis. It consists in an unusually rapid formation of epithelium by the vesical mucous membrane, resulting in the shedding of quite large white, shining plates or bodies of this caked scale. The following case, related by Lowenson (1862), is thus given by Winckel. The patient spoken of by him, suffered from mitral stenosis, and came into hospital in a moribund condition. After death her bladder was found to be enormously dilated. From it were taken a great number of small, rounded yellow masses, lying between a number of plates of dullish color, the general appearance being that of yellow pea-soup, with some of the hulls left in. The whole of the internal surface of the bladder was covered with flakes, many of them having these little balls interposed and superimposed. Their diameter varied from one twenty-fifth to one half inch. These attached flakes were tolerably firm and bright, something like mother-of-pearl. From the mucous membrane itself, after removal of these flakes, pieces of membrane could be stripped off. Except in these places the mucous membrane seemed normal. The urethra and ureters were normal, but the kidneys were in a condition of granular atrophy.

On microscopic examination it was found that the young, oftentimes fatty degenerated epithelial cells (in the commencement), as they approached the surface, took on gradually all the changes of the very large *epidermic cell*, becoming non-nucleated and granular. The little balls consisted of grains of fat, calciform concretions, little nuclei, and epidermic cells. There was considerable stearine but no cholesterine. Reich claims lately, however, to have found the latter in the vesical mucous membrane of a man fifty-six years old, who suffered from catarrh of the bladder.

Treatment.—Of course I have no experience, never having seen a case, but on general principles I would suggest that the treatment would be to relieve any inflammation or irritation that may be present, the exhibition of alkalies and arsenic (in small doses) by the mouth, daily washing out of the bladder, removing all scales or plates that form, and the application of a strong alkaline solution to the diseased surface.

I am unable to give the symptoms of this disease. The same may be said of the diagnosis. I presume, however, that an examination of the urine would enable one to determine the nature of the trouble.

CHAPTER XLIV.

NON-INFLAMMATORY DISEASES OF THE BLADDER.

DISLOCATION OF THE BLADDER.

II. *Non-inflammatory diseases of the bladder.* These are:

1. Dislocations.
2. Foreign bodies.
3. Rupture.

1. Dislocations.—These may be of six kinds: (*a*) upward; (*b*) backward; (*c*) forward; (*d*) lateral; (*e*) downward; in addition to these, we may have (*f*) inversion of the bladder.

Some of these are, even in their worst form, not true dislocations, but represent some hindrance to the proper distention of the organ or its position when distended. Of all dislocations, the most important are the upward, backward, and downward. All of them, however, interfere more or less with the vesical function. Marked dislocation of a healthy bladder often gives rise to less disturbance than slight dislocation of an already irritable organ.

Dislocations of the bladder have various causes, the most common and troublesome being abnormalities of structure and position of the uterus and vagina.

As a matter of fact, these dislocations are usually secondary to some affection of the other pelvic organs. This necessitates a description of their causes as well as the conditions under which they occur, thus deviating from the general order followed in this work.

(*a*) **Dislocation Upward.**—The upward dislocation of the bladder may be caused by the dragging up of the organ by the gradual rising from the pelvis of the gravid uterus. This, however, is a rare affection, and only occurs, I think, in cases where there has been previous inflammatory action in the pelvis, gluing the parts together. In most pregnancies the bladder retains what is, under the circumstances, its normal position. Bands of adhesion passing from the bladder to the various abdominal and pelvic viscera may, when shortening takes place, produce this dislocation. It may also be produced by ovarian tumors, and, in some cases of uterine retroflexion and retroversion. The dislocation accompanying the last two affections is, however, usually more backward than upward.

The other most probable causes are tumors about the neck or base of the organ, tumors of the cervix uteri, pelvic deformities, and pelvic exostoses.

The symptoms are usually those of irritable bladder. In some cases of pelvic tumor the pressure on the neck of the bladder, forcing it against the pubes, produces retention. This is purely mechanical. In other cases, where there is no obstruction to the outflow, but pressure on the bladder, there may be incontinence; and, again, from traction on the muscular walls, patients are unable to contract and expel the vesical contents, and retention results.

I saw a case, in consultation with Dr. A. W. Ford, of Brooklyn, in which the patient had retention of urine, so that she could not urinate while standing, but was compelled to lie down before the bladder could be emptied. The retention lasted one week, and was brought on by the efforts to urinate, which wedged the uterus in the pelvis, and compressed the neck of the bladder. She was relieved by urinating while on the hands and knees.

(*b*) **Dislocation Backward.**—This dislocation stands next in order of importance and unfavorable results to downward dislocation. It may be caused by tumors of the abdomen or by pelvic adhesions, but the most frequent cause is backward dislocation of the uterus, such as retroflexion and retroversion. Retroversion affects the bladder in the same manner as prolapsus, except when the uterus is very much enlarged, and is thrown backward and impacted in the pelvis, so that the cervix presses firmly on the urethra. In such cases urination is impossible. Examples of this are seen in retroversion, occurring in the early months of pregnancy or after delivery. Schatz gives a case due to retroflexion of the uterus during pregnancy, producing the same trouble in the bladder as retroversion.

Winckel saw a case in the body of a non-puerperal woman, in which the uterus was lying almost horizontally in the pelvis, with its fundus adherent to the rectum. That part of the bladder that was drawn most backward had a diverticulum, containing a calculus. The neck of the bladder was fastened down posteriorly by tight bands of adhesion that passed from it over the uterus to the rectum.

In retro-displacements of the bladder, with no pressure on the vesical neck, the symptoms are usually those of irritation, causing frequent urination and tenesmus.

I give here the following cases, as they are of interest, and may serve to fix more clearly in the mind the general points.

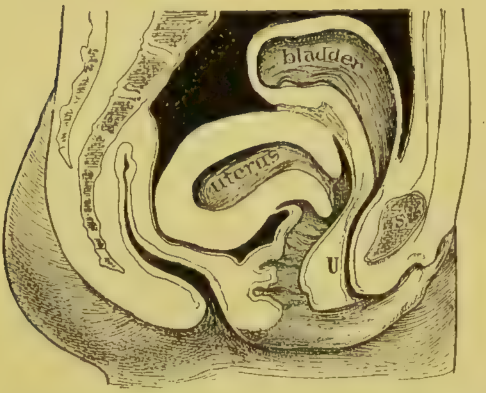

FIG. 265.—Retroversion of the gravid uterus (after Schatz). The bladder pulled upward and backward, and the urethra, U, put greatly upon the stretch.

ILLUSTRATIVE CASES.

The first is a case of chronic retroversion of the uterus, causing marked vesical trouble in a nervous woman. The cause of the bladder trouble is here double: first, vesical neurosis, and second, a displaced uterus.

Mrs. H., aged thirty-six. Married five years, and a widow three years, of a marked nervous temperament. Has never been pregnant. Menstruation always normal, and general health fair in early life. Her general system has been much reduced by nursing her husband, who died of phthisis. Nervous system also much impaired. When first seen, all the functions except those of the bladder were performed well. She suffered night and day from frequent urination, but there was no pain either during or after the act, unless she tried to hold her water for a few hours, when there was great pain after the completion of evacuation. Nervous excitement, pleasant or unpleasant, made the trouble much worse. Her urine was normal.

On examination, complete retroversion of the uterus was found, with shortening of the anterior vaginal wall; the bladder was much contracted, but otherwise normal. The uterus was restored to its place, and held there by a pessary. Hydrobromic acid in thirty-minim doses was given four times a day. She made a rapid recovery.

The next is a case of vesical tenesmus and partial retention from a sudden retroversion of the uterus.

Mrs. G., aged forty-three, the mother of four children. Widow for several years. She was a strong, healthy lady, and had been on her feet all day attending to her household duties, and in the evening, while hanging some pictures, slipped from a chair, and fell heavily to the floor, striking on her feet. She was at once seized with a desire to urinate, and soon after pelvic tenesmus came on. The desire to urinate was constant, and, after strong expulsive efforts, she was able to pass a little urine from time to time, but without relief. The bowels became distended and tympanitic. On the following day she was ordered anodynes, but they gave very little relief.

On the next day she was examined, and the uterus was found to be completely retroverted, and the bladder full, but not overdistended. Replacing the uterus gave her great relief at once, and she has remained well and free from all bladder trouble since the accident occurred, some two years ago. This was a case of acute retroversion of the uterus, producing an intensely painful affection in a normal bladder.

(*c*) **Dislocation Forward.**—Forward dislocation of the bladder, unless it be through the open abdominal walls, is very rare. Some change in its shape from pressure of organs or tumors from behind may occur, but this is really not a true displacement, except in some rare and marked cases. The most frequent cause is pressure from the anteverted and enlarged uterus in either the virgin or puerperal state. Anteversion of the uterus usually causes frequent urination, perhaps as much so as prolapsus; but whether this frequency is due to the fundus uteri resting on the bladder, or to the supersensitiveness of the whole pelvic organs, which usually accompanies this dislocation, I have not always been able to determine. I have been inclined to the belief that the latter was the case. In this displacement (anteversion) the uterus is generally enlarged and elevated, so that the body and fundus rest upon the bladder, and impede its distention.

True dislocation of the bladder forward is the rarest of all dislocations, only three cases being on record. It has been variously called ectopia of the unfissured bladder, ectopia vesicæ totalis, and prolapsus vesicæ completus per fissuram tegumentorum abdominis. The first name is too vague, the last best of all, but rather lengthy for every-day use.

The three cases on record are by G. Vrolik, Stoll, and Lichtenheim. In all these the bladder was protruded through a small slit in the abdominal wall, and appeared as a bright-red, rounded tumor at the lower and anterior part of the abdomen. In Lichtenheim's case only was the tumor reducible. The pubic bones were separated about two inches. The urine could be retained perfectly, and the patient was able to micturate in a small stream. Microscopical examination of the outer covering of the bladder-walls proved it to be mucous membrane, like that lining the interior of the organ.

In G. Vrolik's case, according to Winckel, there is doubt as to whether it was a true vesical ectopia. He believes it to have been a gaping of the fissured abdominal walls over a dilated urachus, the latter communicating with the bladder by a small opening.

In Lichtenheim's patient no operative measures were thought of, for, beyond a little excessive secretion of the external surface, no trouble was experienced. If, however, from the protrusion of the tumor or other cause, difficulty in passing or retaining urine be present, an attempt should be made to close the abdominal fissure. If it be large, two or more flaps may be needed to accomplish the desired result. The operation is very like that for fissure, already described, only more simple.

If an operation is not desired or consented to, the patient should wear a concave compress, and, by attention to bandaging, keep the surface of the organ in as nearly a normal condition as possible.

(*d*) **Lateral Displacements.**—Lateral displacement of the bladder is not very often met with. It is generally due to inguinal or femoral hernia, tumors at the side and base of the organ, and contracting pelvic adhesions. There is generally more or less distortion of the urethra that may hinder the outflow of urine or prevent the easy introduction of a catheter. Irritability may result, but it is not so common as in the other varieties, the organ being generally but slightly displaced, and, soon getting used to the disturbing cause arising from the malposition, produces but little disturbance.

One case of this kind I have seen which was of interest. The patient was a young lady, who had had a pelvic peritonitis, which left her with pelvic tenesmus, ovarian pain, and some vesical tenesmus and difficulty in emptying the bladder. One of my assistants, while examining her, found a fluctuating tumor on the left side, which he supposed to be an ovarian cyst, but which proved to be a left lateral displacement of the bladder fixed in its malposition by adhesions.

Causation.—Its causes are of two kinds—predisposing and exciting. Of the predisposing, the most common are a loose, flabby condition of the vesico-vaginal septum, excessive venosity of same (these may be due to pregnancy or to a general systemic condition), abnormally capacious vagina, unusually large introitus vaginæ, total or partial loss of perineal body, and the tendency of the bladder to pouch inferiorly as age advances.

As exciting causes, we have violent expulsive efforts, as in defecation, lifting heavy weights, and especially child-bearing. The latter is probably one of its most common causes, for not only do we have expulsive efforts of the most violent kind, but a lax, spongy condition of the vesico-vaginal septum—i. e., the anterior vaginal and posterior vesical walls, which are pushed downward before the advancing head.

Another common cause is prolapsus uteri, though in many cases the cystocele precedes the prolapse of the womb. Whichever is the cause, the one aggravates the other. In slight prolapse of the uterus, the vesical symptoms are only those of irritation; and it is a strange fact that the irritation is often as great in the first degree of prolapse as in the third.

Other less frequent causes of cystocele may be tumors in the posterior vesical or anterior vaginal wall, stone in the bladder, vesical diverticuli, violent efforts at urination, and marked pressure from above.

The bladder begins to sag inferiorly as age advances, and consequently the tendency to prolapsus advances, as does the age. The number of pregnancies may, however, have more to do with the frequency than the tendency to pouching in old age.

(*e*) **Dislocation Downward.**—I have reserved this malposition to the last, because it is the most important. There are various grades of the dislocation, the most marked of which is known as cystocele vaginalis.

Pathology.—This affection may be conveniently divided into three grades. In the first, there is but a slight bagging of the organ. In the second, about one half the bladder lies below the normal level of the anterior vaginal wall, giving the organ an hourglass shape, the urethra entering the upper segment just above the point of partial constriction. In the third or highest grade, the whole bladder lies below the level of the normal anterior vaginal wall. The urethra in these cases has a direction from above backward and downward. The ureters in the last two grades are so bent and obstructed by pressure, that dilatation and hydronephrosis may result. Such instances are given by Phillips, Froreiss, Virchow, Braun, and Winckel.

The vesico-uterine pouch is, in cases of marked vesical and uterine prolapse, greatly increased in size, and may contain a loop of intestine. In some rare cases it may become constricted superiorly, and exist as a closed sac.

In chronic cases the vesical mucous membrane becomes hypertrophied, and, in the lower segment especially, congested and œdematous. To this may be superadded cystitis and ulceration, which often follow in cases of long standing.

Symptomatology.—In the first grade of downward dislocation the symptoms are those of irritable bladder, such as frequent and sometimes painful urination. When the displacement has existed for a considerable time, the bladder seems to accommodate itself to the new relations, and the calls to urinate become less frequent. In cases in which the prolapsus of the bladder is slight and there is dilatation or prolapsus of the upper third of the urethra, partial incontinence occurs, a very annoying symptom. Every time the patient coughs, lifts a heavy weight, steps suddenly down from the curbstone into the street, or even indulges in a hearty laugh, there is a sudden escape of urine.

In complete prolapsus of the uterus and bladder, we find instead of frequent urination, difficult urination, and in the worst cases, retention. Partial retention always occurs in the marked cases, and the urine remaining in the bladder decomposes, and in time causes cystitis, which greatly aggravates the patient's sufferings. Such cases are very like those occurring in old men, and due to retained urine by reason of an enlarged prostate gland.

There is usually a dragging pain experienced in the region of the umbilicus, which is due to traction on the urachal cord, and also a constant sense of pain and uneasiness, due partly to the vesical and partly to the uterine malposition.

To fully empty the bladder in the worst cases, it is necessary to relax the parts by lying down, and then force out the urine by pressure on the vaginal tumor.

Cystitis is a common secondary affection, and is due to decomposition of the retained urine, and to chronic congestion with œdema and hypertrophy of the mucous membrane. Winckel's experience has, however, differed from that of most observers, he having failed to find a single instance of cystitis in sixty-eight cases of cystocele.

From pressure on the ureters there may result dilatation and hydronephrosis, and if marked or long-continued, uræmia. There may also be set up that condition known as pericystitis, and the lower vesical segment be rendered irreducible owing to the formation of adhesions.

If cystocele occurs in a patient already suffering from cystitis, the original trouble is of course greatly aggravated.

Cystocele may interfere with delivery during childbirth. In one such case, McKee, being unable to push a catheter into the bladder, punctured the tumor with a lancet, and delivery was rapidly accomplished. In another case, a certain physician mistook the vesical tumor for the bag of waters, and punctured it.

Diagnosis.—This is readily made. The patient should be laid upon her back, with the thighs flexed on the body. If the tumor is already down it should be examined carefully, and also the position and condition of the neighboring organs. If possible, a catheter should be passed into the bladder, to ascertain if it enters the tumor and the direction it takes in so doing should be observed. The tumor should be slightly compressed, and notice taken whether the urine flows from it through the catheter. An attempt should also be made to try to reduce it. The urine should be carefully examined for pus, mucus, albumen, epithelial elements, and the amount of urea should be determined.

Prognosis.—The prognosis is generally good; but in giving an opinion the degree of dislocation, the size of the tumor, the condition of its mucous membrane, whether it is reducible or not, the age of the patient, and the gravity of the producing cause, must all be taken into consideration.

In young patients, Sims, Simon, Hegar, Verf, and others claim to have obtained radical cures. Some of these cures were not, however, lasting. Scanzoni claimed that he had never seen an operation for this displacement that resulted in a permanent success, and that his own operations were by no means satisfactory. My own experience entirely accords with that of Scanzoni.

Treatment.—The treatment consists in reposition and retention. The former is easy, the latter hard to accomplish, as prolapsus uteri and cystocele generally go hand in hand; one can not be treated without the other.

Having pushed the uterus up into position, emptied the bladder and replaced it, some mechanical means should be sought to retain one or both organs in place.

For the purpose of supporting the prolapsed bladder I devised the pessary shown in Fig. 266, and it has been found to accomplish the object fairly well when the pelvic floor is not injured.

This pessary is adapted and introduced in the same way as a retroversion pessary, an account of which will be found under the head of the treatment of retroversion.

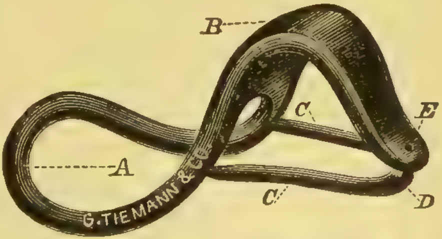

Fig. 266.—Pessary for prolapsus of the bladder (Skene). The main portion, A, surrounds the cervix uteri, and B supports the bladder and upper portion of the urethra. The other part, C C, joins the main portion in front of the uterus, and rests on the posterior walls of the vagina.

The facility of introduction and removal is one of the minor, but by no means unimportant, qualities of this pessary.

Several sizes are made, which answer in most of the forms of displacement of the bladder; but a case will occasionally occur in which it is necessary to first take measurements, and have the instrument made exactly to suit. This can be easily done. The patient is placed on her left side, and after introducing the speculum, the uterus and bladder are restored to their proper positions; then a thin strip of sheet lead is bent to the size and shape of the anterior walls of the vagina and cervix uteri. This form will enable the instrument-maker to produce the required size and shape of the pessary. I have also devised another form which suits some cases. It is like the retroversion pessary which I use, but the sides anteriorly are made more curved and very much thicker than the ordinary one, Fig. 268.

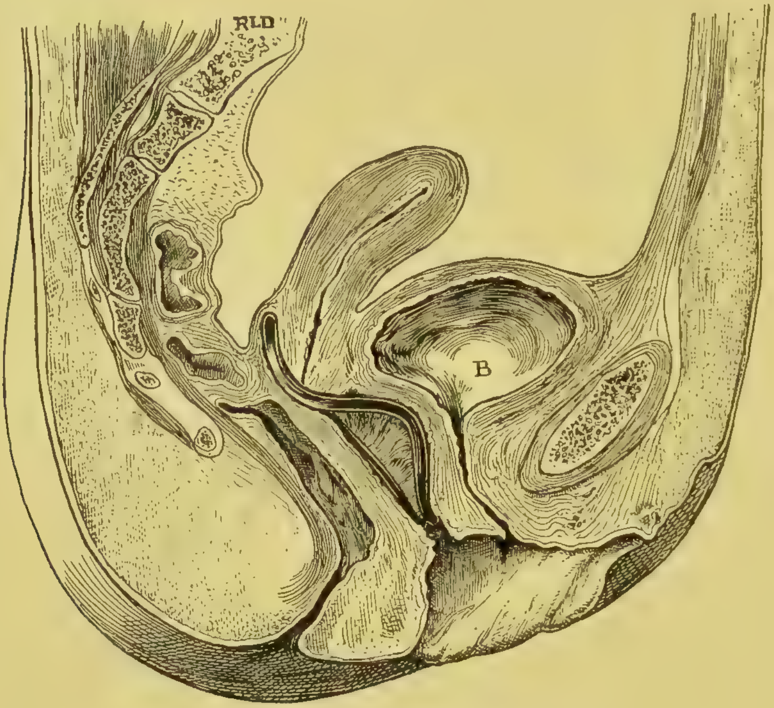

Fig. 267.—Pessary holding up the bladder.

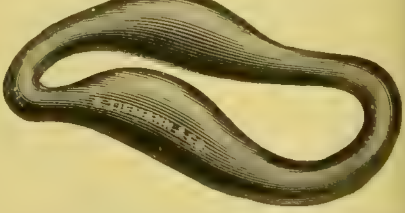

Fig. 268.—Modification of the retroversion pessary, used in prolapsus of the bladder.

Should a pessary fail to accomplish the desired result and the case grow gradually worse and the demand for relief become more urgent, the operation may be performed which is described on page 925 and illustrated in Fig. 281, Plate IV.

HERNIA OF THE BLADDER.

This injury was first recognized by Dr. Paul F. Mundé, and described by him in the "American Journal of Obstetrics," June, 1890, page 614. That it may have been observed by others is possible, but it was evidently not understood until thoroughly investigated by Mundé. Guided by the light which he has thrown upon the subject, I have been able to comprehend a number of cases which were previously obscure, and which, not knowing better, I had classified as cases of prolapsus of the bladder.

The pathology is the same as in all hernial protrusions. There is first a giving way of the anterior muscular wall of the vagina in the median line, and then the bladder, covered only with the vaginal mucous membrane, protrudes into the vagina.

Causation.—There are three causes which I have observed in the cases which have come under my observation:

The first, which occurs less commonly now than formerly, is removal of a part of the vaginal wall, colporrhaphy. In time the scar-tissue stretches at the site of the operation, and the bladder protrudes at the point at which muscular tissue is deficient.

The second cause is, apparently, a laceration of the muscular tissue in the median line during labor. When the hernia is caused in this way the urethra and lateral walls are in proper position, but at the point of hernia the muscular tissue and fascia are absent.

The remaining cause is atrophy of the muscular tissue. This I believe to occur, because it has been found in women past the menopause who have not had children, and who have not been subjected to any injury which could have produced muscular laceration.

Symptomatology.—The symptoms, so far as I have observed them, are the same as in prolapsus of the bladder.

Physical Signs.—The physical signs are, when understood, quite diagnostic. When the perinæum is retracted, the hernia appears as a smooth, hemispherical body, around the base of which the vaginal walls are in normal position. With a sound in the bladder, the thin vaginal wall, which is reduced to mucous membrane only, is apparent to the touch. If any doubt exist about the diagnosis, the results of treatment will determine whether the condition is that of hernia or of prolapse. If it be a prolapsus, which has been treated by the use of a tampon or pessary, with rest in a recumbent position, there will be a noticeable contraction of the vaginal wall and a temporary relief; but no such change occurs as a result of this treatment in case of hernia.

Treatment.—Having failed to relieve hernia by any of the operations recommended for prolapse, I was driven to try an operation which gave me good results, and that, too, before I understood the true pathology of the affection.

The operation consists in making a small opening in the vaginal wall at the junction of the urethra and bladder, and at the lower margin of the hernia. Through this opening a probe is passed and pushed up to the upper margin of the hernia, between the vaginal wall and the bladder. A delicate forceps is then introduced into the tunnel made by the probe, and its blades are spread forcibly apart. The vaginal wall and bladder are then completely separated to the extent of the hernial opening in the muscular layer of the vagina. The probe or forceps is held in place and upward pressure is made with it. This keeps the bladder in place while traction is made upon the vaginal mucous membrane at its upper part. This brings the lateral edges of the muscular layer of the vagina together and develops a ridge of mucous membrane. Sutures are now introduced to hold the parts in position.

The mechanism of this proceeding is the same as in making a tuck. The ridge or tuck of mucous membrane projects into the vagina like the segment of a circle, but soon flattens out and overhangs the line of sutures. Care should be taken not to make the sutures tight enough to strangle the tissues, but only sufficiently so to hold them together until they unite. I have operated in a number of cases, and the immediate results are all that could be desired. I have had an opportunity to observe but four cases long enough to determine whether the cure is permanent or not. In one of these, done five years ago, the hernia shows no disposition to return. The same is true of all the cases that I have operated upon. The first operation was done five years ago, and the last, one year.

Dr. Mundé, in his paper on this subject, commends the operation of Stolz, which consists in the removal of the circular portion of the mucous membrane which covers the hernia, and the bringing of the parts together at one central point with a purse-string suture.

I have tried this operation in three cases, and have found that, while it appeared to answer the purpose, the scar gave way in time and the hernia returned. In fact, the worst case of hernia of the bladder that I ever saw followed a similar operation, which was done for prolapsus.

ILLUSTRATIVE CASES.

A patient who had had a number of children suffered from a prolapse of the bladder and laceration of the perinæum. I performed Noeggerath's operation for the relief of cystocele, and obtained a good result so far as relieving her for a time. She returned four years afterward, suffering as much as ever. I found that the scar left after removing the section of the anterior vaginal wall had become stretched and thinned out, so that the bladder protruded. I vivified the vaginal wall all around the outer edge of the scar, and brought the surfaces together and obtained good union. Two years after this I found the hernia had again returned. This led me to devise the operation which I have described above, and which has given me far more satisfaction.

Hernia following Stolz's Operation.—A patient fifty-nine years old had a prolapsus of the bladder and a laceration of the perinæum of sixteen years' standing. I performed Stolz's operation and restored the perinæum. She was apparently cured, but two years afterward I saw her again, when I found what I believed to be a return of the prolapsus, but I now know that she had a vesical hernia.

Frequent Urination due to Prolapsus of the Bladder.—The patient was thirty-two years old, and had given birth to five children. She had always been well and strong, and at the time that I saw her she was in very good general health. After her last confinement, one year previous, she began to suffer from frequent urination. At first she obtained relief from emptying the bladder, but subsequently the desire to urinate, though not very urgent, was constant when she was upon her feet. On lying down she obtained relief and retained the urine all night, but upon rising and going about the tenesmus returned.

By digital examination I detected a prolapsus of the bladder, but only in a slight degree.

There was considerable relaxation of the pelvic floor and of the vaginal walls, but no laceration of either. In all other respects she was quite well. The urine was normal. She was ordered to rest for a few days, most of the time reclining, and to use vaginal injections night and morning of sulphate of zinc, sixty grains to the quart of warm water. Afterward a pessary was used shaped like Graily Hewett's anteversion pessary, but having the anterior bars thickened.

Immediate relief was given by the pessary, and she was able to walk and stand as she used to in former times. The zinc-douche was kept up once a day, and she was cautioned against walking or standing too long. At the end of six weeks the pessary was removed to see if she could do without it. In a few days the old symptoms began to return, and the pessary was replaced to her entire relief. From this time onward the pessary was changed once a month for a smaller one. Seven months afterward the instrument was removed, and the injections of the zinc solution continued for one month longer. She had no further trouble.

Prolapsus of the Bladder caused by Laceration of the Perinæum.—This lady was forty-one years old, of large form, and had an excellent constitution; she had two daughters, the youngest seven years of age. For nearly six years she had suffered from vesical tenesmus and frequent urination. These symptoms were greatly aggravated by the erect position. In fact, for a long time she was quite comfortable while sitting or lying down, especially the latter. Her symptoms gradually increased, and within the past two years she has had partial incontinence. Any sudden motion such as is caused by crying or sneezing would cause a spurt of urine which was most distressing to her. She became quite helpless although in perfect health. Being unable to stand or walk for any length of time and having partial incontinence she remained in the house all the time. She had been treated with all kinds of drugs, but, as might have been expected, without any relief. I found that she had a laceration of the perinæum, and also a bilateral laceration of the cervix uteri. The bladder was prolapsed and the upper third of the urethra presented the usual signs of the ordinary cystocele. She was admitted to my private hospital, and after having been submitted to preparatory treatment the cervix was restored. While she was recovering from that operation the bladder was kept in place by the tampon, and astringent vaginal injections were used. One month later the pelvic floor was restored, and as much tissue brought together as possible. After the operation the pelvic floor was kept well supported with a compress and T-bandage. The astringent injections were continued. Six weeks from the last operation she was permitted to take exercise, but the pelvic floor was supported for two months longer. After restoring the pelvic floor it was necessary to use the catheter to draw the urine; that excited some irritation of the bladder, but this was relieved by injections of borax and water. She made a perfect recovery, and has remained quite well for more than four years.

Cases of Displacement of the Bladder due to Displacement of the Uterus and Causing Retention of Urine.—(D. Berry Hart, M. D., "Obstet. Jour.," Great Britain and Ireland, August 3, 1880):

Case I.—A. B., aged eighteen, was seen in Prof. Simpson's out-patient clinic, on account of white discharge and pain on making water. Ocular examination of the external parts showed a recent laceration of the hymen and glairy discharge from the ostium vaginæ. On vaginal examination the cervix was found normal in all respects, except that the os looked downward and forward; bimanually, a fluctuating tumor, reaching up a little above the level of the pelvic brim, was felt in front of the partially retroverted unimpregnated uterus. The catheter introduced drew off twenty-seven ounces of urine.

Case II.—Mrs. C. was admitted to Prof. Simpson's ward on account of retention of urine, necessitating catheterism; bimanual examination showed a large tumor in the hollow of the sacrum, marked elevation of the os uteri above the symphysis, and a fluctuating tumor in the hypogastric region, reaching almost as high as the umbilicus. This physical examination and the history of four months amenorrhœa made the diagnosis of retroversion of the gravid uterus perfectly plain. What concerns us here, however, is that the bladder contained only about twenty-three ounces of urine, a less amount than in the previous instance.

Case III.—Along with Prof. Simpson I saw at the Maternity Hospital a patient with rigidity of os uteri, supposed to necessitate early application of the long forceps; supra-pubic inspection and palpation revealed a fluctuating tumor bluntly triangular in shape, with the apex down. Exact measurements showed that vertically it extended four inches, and transversely for about the same distance. The catheter passed deeply up, and drew off only two ounces and a half of clear urine, and some time afterward the same apparent distention occurred, when three ounces and a half were removed. After the bladder was thus emptied, the furrow between cervix and uterus could be felt two fingers' breadth above the symphysis pubis. These three cases are typical instances, and evidently call for explanation.

In the first case narrated the bladder was simply distended. It had pushed the intestines up, tilted the uterus back, but its posterior wall was still in its normal position. The peritonæum was still on the summit of the bladder, but, of course, was stripped to a certain extent from the lower part of the posterior aspect of the anterior abdominal wall. Thus the bladder, though its summit was only at the level of the brim, was considerably distended. Now, in the retroversion of the gravid uterus, the bladder was certainly distended, supra-pubic palpation, however, misled as to the amount of distention, and for the following reason: The cervix uteri was tilted high up behind the symphysis pubis, and consequently the bladder, to whose posterior angle the cervix is attached, was swung up, as it were, into the abdominal cavity, a movement permitted by the anatomical relations behind the pubis. The peritoneal relations were the same as in Case I. In the third case, the bladder was, of course, drawn up, as I have already shown,* and its relations were as follows: In front it touched the anterior abdominal wall; behind, the child's head, the cervix, of course, intervening. In this way the anterior and posterior vesical walls were in contact, and thus a film of urine, as it were, gave the appearance of distention. As I have before pointed out, the peritonæum is stripped off the bladder more or less.†

The conclusions advanced are: 1. The retro-pubic anatomical attachments of the bladder admit of its distention and passage upward. 2. Supra-pubic palpation gives no sure indication of the amount of urinary distention. 3. When the summit of the bladder is above the pubis, it may be (*a*), a pure distention (Case I); (*b*), distention plus a tilting up (Case II); (*c*), drawing up of the bladder, with almost no distention (Case III).

The reason why gynecologists use a long gum-elastic catheter is very evident. I have already described the empty bladder in the non-parturient female as forming a Y-shaped figure on vertical section. During parturition, however, the urethra is elongated, and forms with the bladder, on vertical section, a continuous tube.‡ Only that part of the bladder above the pubis is available for the reception of urine, so that in this way the path for the catheter to travel is increased. In Braune's section of a woman in labor, the distance for the catheter to travel is about four and a half inches, more than twice what it is normally.

In the last place, the distended female adult bladder is quite comparable in its anatomical relations to the distended fetal one. This may point to the explanation that the ultimate changes which convert the urinary bladder from an abdominal organ into a pelvic one is chiefly in the bony pelvis itself.

Retrocession and Forward Transposition of the Uterus.—The various forms of displacement of the bladder described thus far, are usually associated with uterine dislocations, and are familiar to those who have given attention to gynecology. There remains to be noticed two forms of displacement of the uterus not generally described by authors, but which markedly disturb the functions of the bladder, viz., *retrocession* and *forward transposition.* In the first form, the uterus, without any change in the relation of its axis to the plane of the superior pelvic strait, is found to rest far back in the pelvis, and is fixed there. In the second form, the reverse of this exists, the uterus resting just behind the pubes. Figs. 271 and 272, will show these conditions.

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* "Edinburgh Medical Journal," April, 1879.

† "Edinburgh Medical Journal," September, 1879, "Edinburgh Obstetrical Transactions" (Part II, p. 142).

‡ See "Die Lage des Foetus," Braune, Tab. C.

The best example of retrocession I have ever seen was in a patient who had had a severe pelvic peritonitis sometime before she came to me. The uterus was firmly fixed in the posterior portion of the pelvis, and the bladder was drawn backward, and was exceedingly irritable. This condition caused her great trouble, as she could never completely empty the organ, except when the catheter was used. Owing to the fixation of these organs in their malposition, it was impossible to relieve her from the frequent and difficult urination, and she remained a great sufferer, until she died of phthisis pulmonalis.

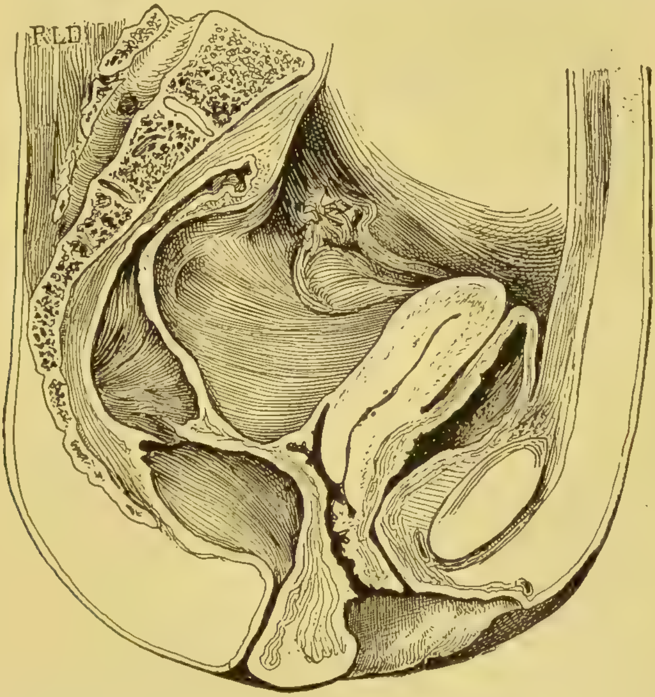

FIG. 269.—Forward transposition of the uterus. The bladder will be seen somewhat flattened against the pubes, and the urethra pushed out of its axis.

To illustrate the forward transposition, I may mention a case that came under my notice several years after she had had an intraperitoneal pelvic hæmatocele. Her physician told me that she had severe inflammation following the internal hæmorrhage, and nearly lost her life therefrom. She was confined to her bed for many months, and after recovery she suffered from frequent urination. Night and day she was obliged to pass water every two hours, and if she went longer than that, she had pain which was not relieved till some time after emptying the bladder. The uterus was situated at its proper elevation, and was just behind the pubes. The bladder was compressed from before backward, and (as the uterus was firmly fixed in its forward position) of course it could never be fully distended. There was no disease of the bladder, so far as could be ascertained from an examination of the urine, or of the organ itself. No treatment that was employed gave anything more than temporary relief.

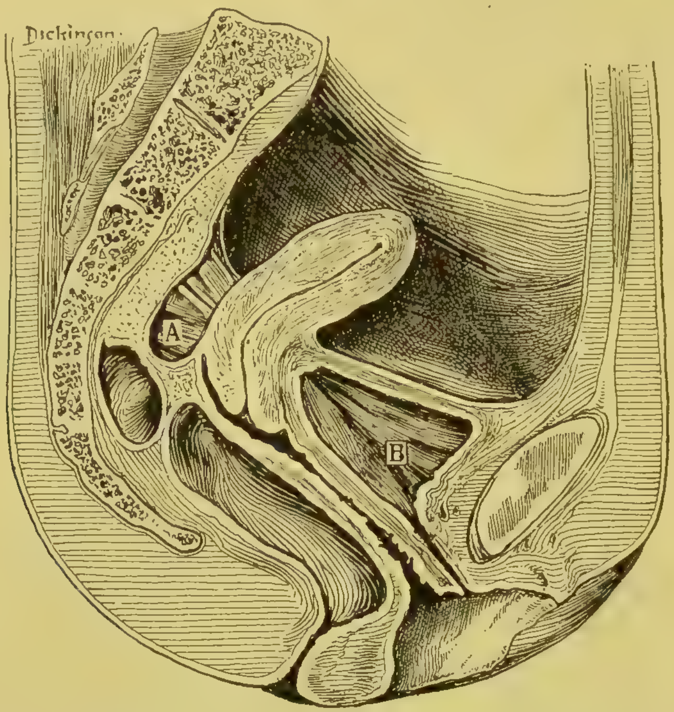

Fig. 270.—Retrocession of the uterus. The vagina is here found lengthened, and the bladder and urethra pulled upward and backward. A, adhesions, B, bladder.

(*f*) **Inversion of the Bladder.**—This affection stands next in rarity of occurrence to complete prolapsus of the bladder through a fissure in the abdominal walls. It is sometimes denominated as extroversion of the bladder through the urethra.

By some authors it is supposed to be a simple protrusion of the mucous coat of the bladder through the urethra, but by others to be a prolapse of the whole organ. In support of the latter belief is the fact that after death Joubert, Rutly and Leoret found a sinking in or partial inversion of the whole organ. Moreover, Meckel claims to have found under the labia minora, and protruding from the meatus a mass of tissue that on careful examination proved to consist of all the elements of the several coats of the bladder.

Burns thinks it much easier for a prolapse of the whole organ to take place than a separation and prolapse of the mucous membrane alone. Streubel, after a careful review of the literature of the subject, was able to find but one case in which the mucous membrane was alone prolapsed. As the posterior vesical wall in the empty organ lies over the vesical opening of the urethra, it is easy to comprehend how this dislocation might occur from sudden straining efforts, pressure of the overloaded colon, or pressure of a heavy uterus. Vesical tumors with long pedicles coming out through the urethra, by weight or from traction, might produce this result. The process of extroversion is generally slow. De Haen, quoted by Streubel, gives a case, however, where from force, the bladder, rectum, and vagina were all prolapsed together. It will be understood that in order to have the bladder turned inside out, the urethra must be abnormally dilated.

It may occur at any age. Weinlecher saw it in a child but nine months old; Oliver, in one of sixteen months; Crobs, in one from two to three years; Streubel, in a girl fourteen years old; and Thomson and Percy, in women aged respectively forty and fifty-two.

Symptomatology.—The patients, even before the tumor appears, feel strong pressure in the organ on urination, and may have stoppages in the stream and retention. After a time these symptoms become aggravated, a small red tumor appears at the meatus, and with each urination enlarges. With the appearance of the tumor comes pain. In some cases, when the desire to urinate is felt, severe contraction of the bladder takes place, but no urine flows. Then suddenly the little tumor disappears inside, and the urine flows freely. With each appearance of the tumor there is considerable constitutional disturbance, and after a time the appetite is lost, and the sufferers emaciate rapidly. From continual traction on the ureters, they may become inflamed, and also the kidneys, and uræmia supervene. Blood is sometimes passed with the urine. Cystitis may occur, which increases the suffering and danger. The mucous membrane may become hypertrophied, congested, and even œdematous.

The constitutional symptoms bear no relation to the amount of tissue extruded or the area of mucous surface exposed.

Diagnosis.—Fortunately, this affection is a rare one, for the diagnosis is by no means easy. The surface of the tumor should be examined, and the nature of its epithelium carefully noted. Reduction should be tried, and, if successful, examination should be made by the sound in the bladder, and the finger in vagina or rectum (the latter in infants), to ascertain, if possible, whether there be any thickening of the membrane or a tumor in the viscus. If on the surface of the protrusion the orifices of the ureters can be found, the diagnosis is at once settled. Polypoid projections of the mucous membrane must be differentiated from protrusion of the viscus itself. Such cases are described by Baillie and Patron.

From prolapsus of the urethral mucous membrane, which I shall hereafter describe, this condition is to be differentiated by the absence in the latter of the ureteric openings and the position of the meatus urinarius. In urethral prolapse the orifice is situated either centrally or superiorly, while in vesical protrusion the meatus *surrounds* the pedicle. In the latter there is a large strong pedicle; in the former none.

Treatment.—The treatment naturally divides itself into prophylactic and curative. To prevent partial extroversion from becoming complete, narcotics and demulcents should be given by the mouth and rectum, or injected into the bladder. Opium, hyoscyamus, and belladonna may all be tried. Local cauterization and washing out with tonic injections might prove serviceable. These preventive means are usually sufficient, provided the urine is normal and the mucous membrane healthy. If either of these abnormalities exist, they should be corrected.

If the tumor is down, its reposition should be attempted. Gentle manipulation with the finger should be tried, and, if the mass can not be put back in this way, a well-oiled blunt catheter should be used, making pressure with it in the direction of the axis of the urethra. If this is very painful, and there are spasmodic contractions of the abdominal muscles, which prevent replacement, the patient should be etherized, and success may then follow. She should be on her back, or in the Sims's position.

To prevent prolapse after reduction, the catheter may remain *in situ* for a time, or the colpeurynter or tampon may be used. Schatz's pessary for urinary incontinence may be employed advantageously, as its use tends to contract the vesical neck. Astringent injections may be used. No operative procedure is required.

CHAPTER XLV.

NON-INFLAMMATORY DISEASES OF THE BLADDER (CONTINUED).

FOREIGN BODIES IN THE BLADDER.

Foreign bodies found in the female bladder are divided into three classes by Winckel, as follows:

(*a*) Those that come from the body, entering the bladder by perforation.

(*b*) Those which have their origin in the bladder.

(*c*) Those that are introduced from without through the urethra. I will adopt this classification, believing it to be the most natural and convenient.

(*a*) First then, as to those that come from the body, entering the bladder by perforation.

That cysts ever originate in the bladder is doubted by some and denied by others. In most cases where they are found in this organ they can be traced to dermoid cysts of the ovary which have found their way into it, thus accounting for the presence of hair, teeth, and other tissues in this viscus. These things are never found there unless such a cyst has opened into the bladder. The contents of these dermoid cysts may become nuclei for calculi, and lead to serious trouble.

I think there can be no doubt but that some of the cysts found in the bladder have their origin there. Mucous follicles certainly do exist in the bladder, and are liable to have their orifices blocked or occluded, and by secretion behind the point of obstruction gradually form cysts. Interesting cases, where the cysts evidently had their origin in the bladder itself, are related by Paget, Liston, and Campa. It is, however, undoubtedly the fact that most cysts of the bladder have their origin outside that organ.

Cysts of the ureters and urachus may open into the bladder. Hydatid cysts have been found, but are less frequently seen in this country than in almost any other. Iceland is especially cursed with them, about one sixth of the population suffering from them in some part of the body. They may appear in the urine, white and pearly in appearance, or be of a dirty yellowish color, from prolonged soaking in foul urine.

Treatment.—These cysts, or their contents, if giving rise to any trouble, should be treated in the same manner as the neoplasms, of which I shall speak later.

In the treatment of hydatid cysts, iodide of potassium has been especially recommended. Having never had occasion to use it for this purpose, I can say very little for or against it.

Other Foreign Bodies.—Various parts of the fœtus have found their way into the bladder by ulceration during extra-uterine pregnancy, and pieces of ulcerated intestine, masses of feces, fecal concretions, and biliary concretions, are some of the curious things that have been found in this viscus. In gun-shot and other injuries to the pelvic bones, osseous splinters have found their way into the viscus, and been evacuated through the urethra, or have passed into the vagina or rectum by ulceration, or have remained, forming nuclei for calculi.

Various parasites may penetrate the walls from the immediate tissue or neighboring organs, or come down from the kidneys, such as the echinococci, already spoken of, the distoma hæmatobium or the filaria sanguinis hominis. Joints of tape-worm, the ascaris lumbricoides, and the thread- or seat-worms have also been found here, entering either through a fistulous opening, existing between the bladder and intestine, or through the urethra.

In acute destructive change in the kidneys (pyonephrosis and abscess), pus and pieces of renal tissue are not unfrequently carried down into the bladder, and may, by frequent incrustation with the urinary salts, result in the formation of calculi. Of themselves, they give rise to very little, if any, irritation, and are consequently of no importance save in relation to the destructive changes going on in the kidney, of which they tell the story. If such discharges from the kidneys continue for a long time, they cause cystitis.

Renal calculi may become dislodged, and be swept down into the bladder, there to enlarge by further incrustations, or pass out through the urethra.

Symptomatology.—The symptoms of the various foreign bodies in the bladder differ only in degree. They are at first those of irritation; later those of acute or subacute inflammation. Bodies round, smooth, and soft, are, of course, less irritant than those that are rough or sharp. Cysts, therefore, bits of flesh, and their like, as a rule, give rise to no very severe symptoms, while splinters of bone and calculi occasion much more severe manifestations. Pain and tenesmus will vary with the character of the offending body. If the mucous surface be abraded or torn, hæmaturia will result; and, if the foreign body remains in the organ, and continues to irritate it, cystitis will follow, and the patient suffer increased agony.

The extension of the inflammation upward, and involvement of one or both kidneys, will give rise to pain in the back, hectic fever, partial or total suppression of urine, and consequent uræmic symptoms, ending fatally.

The urine shows the various appearances of cystitis, of which sufficient has already been said, and also the signs of renal involvement, if such be present.

Treatment.—Any foreign body, when known to be present in the bladder, should be removed at as early a date as possible. In the adult female this may be readily accomplished by dilatation of the urethra, or, if the body be too large, by Simon's vesico-vaginal section.

In cases of fistulous communication between the bladder and intestine or other organ, an attempt should be made, in the manner already spoken of, to close the opening.

Echinococci and other parasites should be treated with the various remedies recommended for their destruction elsewhere, always, however, removing the offending body from the bladder first, and trying to prevent further invasion by proper medication.

If cystitis be present, this will be attended to in the prescribed way.

Hydatids in the Bladder.—Dr. J. A. McKennion, of Selma, Alabama, reported a case in the "American Medical Weekly," Louisville, Kentucky, in 1874 or 1875. The purport of this report, according to my recollection, is that it was a case which, when first seen, had every indication of cystitis, with great thickening of the walls of the bladder. Frequent micturition caused the patient to exclude herself from society for two years before a correct diagnosis of the case was formed. She was becoming prostrated from constant dysuria, and, in order to give her quietude, Dr. McKennion says, I attempted to introduce a Sims's catheter, to be retained during the night; but, meeting with an obstruction in the bladder, and, by manipulation with catheter, finding that she was insensible as to the point of the instrument, I concluded that a hydatid formation was present, and designed at once to have it expelled if possible.

I would say here one of the strongest arguments in my own mind at the time of hydatid formation was, when force was used to push up the instrument farther, a small amount of fluid escaped, and no blood. I injected into the bladder two drachms of liq. sodæ chlor. (French preparation). In about an hour violent spasms of the bladder occurred, the urethra dilated, and there was expelled into the vessel about a pint of hydatid. The shape and attachment of these resembled the cactus; the sacs were transparent and well defined. There was but slight hæmorrhage. This I attributed to the forcible distention of the urethra. It is now over five years since their expulsion, and up to this day my patient has had no more inconvenience with her bladder. Fortunately, my case was a female, and she is well; this might not have been if it had been one of our own sex.—*New York Medical Record, November 20, 1880, p. 588.*

(*b*) **Bodies having their Origin in the Bladder Itself.**—Under this head come calculi, which may be of various kinds, as uric acid, triple and amorphous phosphates, oxalate of lime, and cystine. The latter are quite rare. Again, the calculi may consist of more than one of these ingredients.

Time will not allow me to enter into the extensive field embracing the etiology and treatment of stone. For a comprehensive study of this matter, I must refer the reader to any one of the many excellent works on that subject.

Calculus.—I shall only speak of one or two points in connection with calculus that are of especial interest in the study of disease of the female bladder. Stone in the bladder is not so common among women as among men. This, I presume, is owing to the large and easily dilatable urethra of the female, which permits small renal calculi to pass out; calculi of the same size in the male being retained in the bladder, and serving as nuclei for larger ones.

Symptomatology.—The symptoms are simply those of a foreign body in the bladder, varying with the size, shape, and number of the stones, and also their roughness of surface. Frequent urinations, tenesmus, pain before, during, and after urination, sometimes incontinence, and always more or less cystitis. Hæmaturia is not at all infrequent, and the urine presents all the characters of bladder inflammation, as shown by the presence of pus, epithelium, and, sooner, or later, numerous crystals of the triple and amorphous phosphates.

The constitution suffers from the constant pain and frequent urination, and the patient gives all the symptoms of a severe cystitis.

Diagnosis.—This is comparatively easy in the female bladder, for between the judicious use of the sound, conjoined manipulation, and the bladder speculum, a stone can hardly escape detection unless it be very small or completely encysted.

Prognosis.—The prognosis in vesical calculus in women is good, provided the kidneys be not seriously disordered. The cystitis usually disappears soon after removal of the foreign body, under proper treatment; and even if renal disease exist, it may also subside.

Causation.—The causes of stone in the bladder are about the same in both sexes, and so I need not dwell long on this part of the subject. I may call attention to one cause of the formation of stone in the bladder of the female. In cystocele, a mass of mucus or shreds of membrane and triple and amorphous phosphates gradually collect in this abnormal pouch, and form a nucleus for stone. It is a curious fact, too, that women are particularly liable to have stone after the operation for closure of vesico-vaginal fistula. There has been considerable discussion as to whether calculi, discovered soon after this operation, existed undiscovered in the bladder before the operation, or were formed rapidly after it. Henry F. Campbell, M. D., of Virginia, relates one case in favor of the former view, and Dr. T. A. Emmet several in favor of the latter.

The belief has been advanced that irritation in the bladder modifies the urinary secretion sufficiently to cause deposit of the urinary salts, and thus account for the formation of stone after the operation for fistula. It is claimed that reflex nerve action is excited by the operation, the inflammatory action about the edges of the wound, or by cystitis already existing.

This idea that the reflex nerve influence modifies the urinary secretion sufficiently to result in the formation of stone in these cases, is, I think, hardly tenable; for in hundreds of cases of cystitis, where the reflex action does undoubtedly exist, no stone is formed. Then, too, the secretion is as a rule rendered more watery, instead of concentrated, a condition in which precipitation of the urinary salts would be very unlikely to take place.

A middle position on this question seems to me to be the most rational, and stones found after operations for closing fistula might be due to any one of three causes:

(*a*) Calculus already existing in the bladder, escaping detection by being pocketed, or so small as to lie beneath a mucous fold, and rapidly increasing in size after operation, due to the retention of the salts of the urine (deposited by decomposition), that formerly escaped by means of the fistula.

(*b*) Calculi, small or large, existing in the kidneys or renal pelves, and washed down after the operation by the increased flow of limpid urine: these, too, increasing in size by incrustation.

(*c*) Calculi, the formation of which commences directly after closure of the wound, due partly to retained products of decomposition, possibly to modified secretion, or to small nuclei swept down from the kidney, or, what is much more likely, to nuclei consisting of pieces of mucous shreds, blood-clots, or possibly incrustations on one or more of the sutures which may be exposed in the bladder.

I am quite sure that the formation of calculi after closing a vesico-vaginal fistula is favored by the presence of the catheter in the bladder during the healing process. The drainage is imperfect and if the bladder is not frequently washed there is every facility for the deposit of urinary salts and the formation of stone. I am the more persuaded that this explanation is correct from the fact that, since I have permitted my patients to empty the bladder in the natural way after the operation, I have not had a case of stone following this operation.

Treatment.—The female bladder presents an inviting field for experiments on the treatment of stone by solvents; but as the operation here is so easy and its results so good, it seems hardly justifiable to recommend any other method of treatment. In patients, however, who object to the operation, it may be tried. For a full and interesting account of experiments and statistics on the solvent method, I refer to Mr. Roberts's most excellent work on "Urinary and Renal Diseases."

The stone being found and its size determined, it may either be removed by cystotomy or crushed. If the stone be small and soft, it may be advisable to crush it, washing out the fragments through the open speculum in the moderately dilated urethra, thus saving the urethral mucous membrane from laceration by the sharp fragments; or better still the *débris* may be removed by Bigelow's method.

If much cystitis be present, however, or if the stone be large, it is advisable to perform vaginal cystotomy. In this way a stone of large size may be removed from any part of the bladder, and an opening for drainage is left to act beneficially on the inflamed organ by giving vent to the urine and its sediment. The bladder should be carefully washed out daily with a warm solution of salicylic acid (1 to 600 or 1 to 400). If drainage is desired, care must be taken to keep the incision open, for it closes very readily.

I have spoken several times already as to the method of per forming vaginal cystotomy. Emmet dwells especially and justly on the necessity of fixing the vesico-vaginal wall firmly with a tenaculum before commencing the incision, which may be made with either a knife or scissors. A calculus in the bladder, if interfering with labor, or if liable to be caught between the child's head and the pubes, should, if possible, be pushed up out of the way. This is seldom successful, and as much damage may be done the bladder by the crushing of its walls, it is best to puncture and remove the stone at once in case there is time during the labor and the attendant is prepared to operate. Should it be impossible to operate before labor is completed, it should be done as soon afterward as practicable. It should be borne in mind that the vascularity is greater in the puerperal state and hence every preparation should be made to arrest hæmorrhage.

ILLUSTRATIVE CASES.

Foreign Bodies in the Bladder.—By L. H. Dunning, M. D.; read before the "Indiana State Medical Society":

Case I.—Mrs. A., aged thirty-eight, married, a lady of culture and refinement, was delivered, four years previously, of a hydrocephaloid child. The delivery was instrumental. Whether from long pressure of an abnormally large head, or from maladroit use of instruments, I know not, a vesico-uterine or vaginal fistula resulted. The precise location of the original opening of the vaginal or uterine extremity of the fistula I am unable to state, as two operations had been done for its closure, both of which were unsuccessful. The last operation was done in June, 1883, and in the following December I was consulted in consequence of intense pain and burning in the region of the bladder, and pain at the close of the act of urinating. The patient stated she had, a few weeks previously, passed a small stone by the urethra, and now thought there was another and larger one present. An examination with the sound confirmed her diagnosis. I proceeded to remove the stone, assisted by Dr. S. L. Kilmer. The urethra was dilated with a three-bladed dilator, the stone crushed with a Thompson's lithotrite, and removed with Bigelow's evacuating apparatus. We were both confident all the stone was removed. The patient made a good recovery, but was not entirely relieved of the bladder symptoms. In March, 1884, I was again called to remove a stone, which the patient stated she had felt with the large end of a shawl-pin introduced into the bladder through the urethra. This time, assisted by Dr. M. L. Morse, a large quantity of stone was removed in the same manner as at the first operation. The lithotrite was introduced three times, and, the last time it was withdrawn, we found within the grasp of its closed blades a silver-wire suture, with the loop cut, but the twist intact. The whole was coated with a phosphate-of-lime deposit. We now felt confident we had secured the foreign body around which the calculus had collected. The patient stated to us that she had been aware ever since the last operation for fistula that there was a wire left behind, and that she had once visited the surgeon to have it removed, but it could not be found. There are many other points of exceeding interest connected with this case, but they are not pertinent to this subject, hence will be omitted. There was a band of dense cicatricial tissue extending transversely across the fundus of the bladder. Posterior to this band was a pocket, in the bottom of which was the vesical extremity of the fistula. In this pocket lodged the stone, and was evidently made stationary by the suture, which remained partly imbedded in the tissues. That the wire rendered the stone stationary finds support in the fact that, July 18th, four months after the wire was removed, a fourth large calculus had formed in the bladder, and was quite movable. This last calculus was readily crushed, and voluntarily expelled from the bladder along with water freely injected into the organ. Since this fourth stone was removed, there have been no signs or symptoms of a calculus in the bladder.

Case II.—Mr. B., a laborer, aged fifty-seven years, was brought to me, by Dr. Kettring, September 19th, of last year, for the removal of a foreign body from the bladder. The patient stated that, about the middle of August, he passed a cigarette-holder into the orifice of the urethra; that it slipped away from him, and passed down into the urethra, and, in his efforts to remove it, pushed it into the bladder. Being a mechanic, he had invented an instrument with which he attempted to remove the body, without success. I sounded the bladder, and found the holder lying obliquely across the organ. I judged it to be about two and one half inches long, and as thick as a small lead-pencil. A No. 18½ sound dropped readily into the bladder, and, since the urethra was of so large a caliber, and the patient had frequently passed his instrument along its track, I concluded to attempt its removal without further dilatation. A Thompson's lithotrite was introduced, and the body seized; but I was made conscious that the instrument did not grasp it at the end, so I withdrew the lithotrite and introduced a sound, and endeavored to bring the long diameter of the holder in line with the urethra. Now, with but little difficulty, the end was grasped by the blades of the lithotrite, and I proceeded to withdraw the whole. It soon became evident that we had not rightly estimated the size of the holder, for, although it, together with the instrument, entered the prostatic portion of the urethra, we had considerable difficulty in making it advance through the membranous portion. However, avoiding much force, but keeping steadily at work, with the aid of Dr. Kettring, I succeeded in withdrawing it to within one inch and a half of the orifice of the urethra. Further than this we could not advance; so the urethra was incised posteriorly down to the end of the holder, and, by applying pressure from behind, made to enter the incision, and was finally entirely withdrawn. We were surprised to see the size of the holder and its breadth when in the grasp of the lithotrite, thirty-five millimetres. There was a moderate amount of hæmorrhage from the urethra or bladder; probably from the membranous portion of the urethra, since that is the most constricted portion of the canal. The bladder was washed out with tepid water, and the patient taken to his home in a closed carriage, the operation having been done at my office on account of the patient's refusing to have it done at home for fear of exposure. Soon after reaching home, the patient had a chill, followed by fever. In the next twenty-four hours he had three chills, each time followed by increased fever, the temperature ranging from 102° to 104° F. The urine passed was freely mixed with a considerable quantity of mucus and a little blood.

20th, 1.30 P. M.—Patient seen by Dr. Kettring and myself. Had a temperature of 106°. He voided urine in our presence; it was quite bloody, and, upon close examination, was found to contain a wedge-shaped piece of mucous membrane twelve millimetres long, four millimetres broad, and about two millimetres thick. This was not examined with the glass, but was supposed to be from the membranous portion of the urethra, since at that point there was the most resistance. There were also voided at this time several small grains of gravel, some as large as wheat-grains Patient complained of considerable pain. Bladder was washed out with warm carbolized water. Twenty grains of quinia sul. were given; one grain opium and ten grains of acetate of potash every four to six hours, and a milk-diet ordered. Further than this, I will not attempt to minutely detail the history of the case, but will simply outline it. In the next twenty-four hours the patient had four chills. The temperature ranged from 101° to 104°, and the pulse from 108 to 120 per minute. Patient perspired profusely, and was at times delirious; great nervousness; prognosis was regarded unfavorable. Whisky, in ʒ jss doses, every hour, when the temperature mounted high, was added to the treatment. Dr. Kettring washed out the bladder twice every day, using for this purpose a soft-rubber catheter and a rubber bag. We debated the advisability of this procedure, but found that, by this means, we removed a considerable quantity of turbid urine, small clots of blood, and occasionally small grains of gravel; and further, the cleansing of the bladder seemed to afford the patient relief; so we decided to persist in it as long as its use was indicated.

22d.—Patient slightly delirious; pulse, 112; temperature, 101°; slept moderately well last night; has had no chill since 9 P. M. yesterday. Dr. Kettring found morphine, gr. one sixth, ar. spts. ammo., ʒ jss, very efficient in relieving or aborting the chills. At noon to-day patient seemed much better; at 9 P. M. temperature had fallen to 100°, and pulse to 90; but the urine had accumulated in the bladder, and had to be removed by catheterization.

23d, 7.30 A. M.—Patient rational; has slept well during the night, and voided urine frequently; pulse is 70, and temperature normal; the nervous symptoms have nearly disappeared; had symptoms of a chill last night, which quickly disappeared under the effects of the morphine and ar. spts. of ammo., with the addition of ten drops of chloroform.

From this time forward the recovery was uninterrupted. In one week the patient was able to sit up. A few days later he was walking about the streets, and in two weeks after the operation resumed work.

Thus happily terminated a case that at one time was exceedingly alarming, in consequence of the intense urethral fever that developed. It would undoubtedly have proved fatal had it not been for the skill and unremitting attention bestowed upon the case by Dr. Kettring.

Stone in the Bladder; Lithotrity by a Single Operation. (N. A. Powell, M. D., Edgar, Ontario.)—S. F., aged now five years, first presented symptoms of trouble referable to the urinary organs in October, 1876. Pain, partial incontinence, and the passage of blood and mucus continued from this time, and in January, 1878, a bit of "gravel" the size of a split pea came away. During the following spring the desire for urination became almost constant, and vesical tenesmus was marked. On June 12th, my friend, Dr. Blackstock, of Hillsdale, was called to see her, and on the 13th, under an anæsthetic, he examined, and found a calculus at the neck of the bladder.

An operation for its removal was advised, and pending this, anodynes were freely given. On July 9th, the writer, in consultation, saw the case for the first and only time. The child was said to be failing very fast; she was much emaciated; was suffering severely, and seemed to gain a respite from her pain only when violently rocked while in the knee-chest position in a cradle. Pulse 140, temperature 102½° F. Chloroform, replaced later by ether, was given, and a stone found jammed into the upper part of the urethra. This was displaced upward, caught in the blades of a smaller Weiss and Thompson lithotrite, and crushed. The scale showed five eighths of an inch separation of the blades. Further comminution of the fragments was effected by means of long polypus forceps. Evacuation was accomplished by the same, aided by the frequent injection and aspiration of warm water through a large-sized Eustachian catheter, to which a strong rubber bulb had been attached. This last was the best substitute at hand for Bigelow's or Clover's apparatus. The vagina was too small to admit a finger without undue stretching, but water could be retained in the bladder by pressure upon the urethra.

The first calculus being removed, suprapubic pressure brought two other and smaller ones within reach, and these were treated as the first had been. The distance between the outer surfaces of the blades of the forceps used when grasping the largest fragment removed was three tenths of an inch; this, then, was the limit of urethral dilatation. The lithotrite was used for crushing five times, the forceps twenty or thirty times. The time occupied was one hour and a quarter. The bladder being washed and aspirated till, as nearly as possible, freed of its solid contents, the child was put to bed with hot applications over the pubes and to the extremities, and a full anodyne was given. The *detritus* collected at the time of operation weighed 241 grains; subsequently seven grains more were obtained from the strained urine.

For the history of the case after this, I am indebted to notes kindly sent me by Dr. Blackstock or his assistant Mr. Gould, who, with my students Messrs. Shepherd and Bremmer, gave assistance during the operation. "Partial control of the urine returned on the day following the lithotrity, and complete control, except during the night, after three days. The desire to void urine occurred about every hour for several days, and at the end of a week, about every third hour. Slight hæmaturia was noticed for two days." Under date August 27th, I hear that "the child's general health is good. She is gaining in flesh, and has no symptoms of her former trouble."

The above case would a year ago, hardly have merited transcription from the case-book of a country physician to the pages of a medical journal. But since the appearance of Dr. Bigelow's paper on litholapaxy * the whole subject of the tolerance of the urinary bladder for prolonged instrumentation has come up for reconsideration, and this is offered in evidence.

From Civiale down, all lithotritists, so far as the writer's knowledge extends, have held that the visits of a lithotrite to the interior of a bladder must be strictly limited in point of time. Though experts may, at times, have given themselves more latitude, they have always taught others not to exceed five minutes for any one crushing. Of late years, also, the tendency has been to confine the operation within narrow and yet more narrow limits, treating by it only such moderate sized stones as could be got rid of in from two to four sittings. It remained for the Harvard professor to demonstrate that the calculus-containing bladder of an etherized man might be manipulated for one, two, or more hours, and yet not resent it by cystitis or subsequent atony; *provided* that no sharp fragments were left in it to do outrage to its lining membrane. Although the case just given occurred in a female child instead of in an adult male, it seems to support Dr. Bigelow's conclusions as to vesical tolerance. Surely the delicate tissue of a child's bladder is ill adapted for prolonged contact with instruments, while the proportion of the organ covered by peritonæum in the child being greater than in the adult, there would seem to be a greater danger of serous inflammation. Yet, here all irritation promptly subsided when the irritant was removed, although its removal took one hour and a quarter. May we not expect like results when even large stones are crushed in the male bladder, and evacuated by the new method? Statistics so far —seventeen cases, sixteen successful—seem to point that way.

It may be asked why the urethra was not more widely dilated in this case? My answer is that too large a proportion of those thus treated have been made dribblers for life by it. The ease with which stretching may be accomplished, and the free access which it gives to the bladder, will strongly tempt a surgeon who does not look beyond the operation he has to do at the future life of his patient. Prof. Simon, of Heidelberg, made † many accurate measurements to determine the extent to which the adult female urethra may be dilated without the risk of incontinence. His limit is in width, eight tenths of an inch; in circumference, 6·3 cen., (=2·4 inches). This would allow a finger to pass, but not a finger plus a pair of forceps. Mr. J. R. Lane thinks no stone larger than an acorn should be removed entire through the urethra of an adult female, and none larger than a bean through that of a child. Dr. Hunter McGuire, of Richmond, Va., states that many cases of so-called successful operations by dilatation and extraction have, to his personal knowledge, been followed by incontinence. Rapid dilatation, however, seems to be less dangerous than slow. In proof of this, I may, in conclusion, mention that I have knowledge of the case of a girl, aged twelve years, into whose bladder a pair of sequestrum forceps was pushed, a calculus seized and extracted *vi et armis*, dilating and lacerating the urethra as it came. The stone was as large as a pigeon's egg. Absolute incontinence existed for twelve days, but was followed by recovery.

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* "American Journal of Medical Sciences," January, 1878.

† Translation in "New York Medical Journal," October, 1875.

Stone sacculated in the Bladder of a Female. (By Charles Williams, F. R. C. S., Ed., Surgeon to the Norfolk and Norwich Hospital).—Cases in which a vesical calculus is impacted in a cyst situated in the walls of the bladder are so extremely rare that I consider it a duty to record this very interesting example:

A fine, healthy girl, aged three years, living in Norwich, came under the care of the late Mr. George Hutchison in the year 1873, having for several months previously suffered from very decided symptoms of stone in the bladder. It had been noticed by her mother that from the time of her birth she had experienced difficulty, as well as occasionally severe pain in passing urine, and that sometimes she voided blood mixed with it, and was in the habit of straining so violently as to produce prolapsus of the rectum.

On sounding the bladder, which was an unusually capacious one, it was with some difficulty that a calculus could be detected. At the wish of the parents Mr. Hutchison resolved to remove the stone by dilatation. Mr. W. H. Day assisted at the operation, and I was requested to administer chloroform. The urethra was freely and quickly dilated with Weiss's trivalve dilator. There was considerable trouble to find the stone, and when found a still greater trouble to seize it with the forceps, (and it was particularly noticed that, although the patient was thoroughly under the influence of the anæsthetic, the getting hold of the stone with the forceps occasioned severe straining); the blades could not be made to grip the calculus; they continually slipped off, bringing away pieces of the stone. At last it became absolutely necessary to ascertain what occasioned the difficulty. For this purpose the urethra was still further dilated, and the neck of the bladder was also divided with a probe-pointed bistoury. The stone could now be felt with the point of the finger immovably fixed in the floor of the bladder on the patient's left. It appeared to be of the size of a pigeon's egg, and was inclosed in a sac, through the neck of which a small portion protruded into the vesical cavity, and it was off this nodule that the forceps so continuously slipped. Many efforts were made to dislodge it—first with a scoop, then with the finger, which could barely reach it, and next with the forceps; they all proved unsuccessful. Several portions were broken off the uncovered portion, but the main piece was left *in situ*, as it was considered undesirable to make any further attempt to remove it, the patient having been a long time under the influence of chloroform, and apparently in a very exhausted condition.

The next day the child had voided very little urine. A catheter was introduced, and a small quantity of sanguineous urine flowed out. She was very drowsy, and had been so since the operation. When aroused she took milk and brandy very freely, but immediately afterward became drowsy again. She did not appear to have recovered from the influence of the chloroform. The next day she died. No post-mortem examination was permitted.

I am induced to believe that this child died of chronic chloroform-poisoning, and not from the effects of the operation, which was by no means roughly performed, and that there was very little blood lost. She never thoroughly revived, but became comatose, and died in that condition. It is difficult to imagine what could have given rise to the formation of the sac. There never was an obstruction to the escape of the urine, such as stricture or prostatic enlargement might engender, for neither existed. We are taught that a cyst is usually formed by the straining necessary to expel the urine; the mucous membrane is forced between the bands of muscular fibers, hypertrophied in consequence of the strain to which they are subjected. Nothing of the sort can apply in this case, and it is not easy to believe that the stone was the cause of the cyst, which it might have been, had it been situated close to the neck of the bladder. When impacted in this situation, the very pressure to which a stone is subjected by the constant and long-continued action of the bladder to expel it, causes the mucous membrane to ulcerate through, and the stone is in due time forced into a cavity, which enlarges as the stone grows, and in this way it may form a tumor in the vagina. An effort is then made by nature to contract the opening, which in this child was nearly accomplished; but the calculus was far from the neck of the bladder, and could barely be touched with the point of the finger, so that a different explanation of the formation of the cyst is required; and as no examination was allowed to be made, it seems to me to be almost impossible to suggest in what way the sac was formed. Sabulous matter, or a few urinary crystals, may probably have been deposited originally in a mucous follicle, lacuna, or fossa, and gradually augmented in quantity, and in this way the sac inclosing the calculus may have been produced. The mother of the girl at four years of age suffered from stone, which was removed by the late Dr. Edward Lubbock; it was the size and shape of a walnut. She has suffered from incontinence since that time.

I believe that it would have been very much better to have removed this stone by cystotomy. Had the patient lived she would have suffered from injured urethra.

(*c*) **Foreign Bodies introduced into the Bladder through the Urethra.**—Of these it may be truly said that "their name is legion," for in the literature of the subject we find recorded a most numerous and diverse list of objects found in the bladder of the female. Some of these objects were forced into the bladder by accidents, such as falls or blows; others were intentionally introduced into the urethra for the purpose of masturbation, and then pushed or drawn into the bladder. The same may occur in auto-catheterization, the instrument being sometimes broken off in the bladder, and at others, drawn bodily into the viscus.

Hysterical and foolish women, with or without the intention of masturbating, have passed all manner of things into the bladder, as pins, needles, matches, sand, charcoal, bits of glass, bodkins, and tooth-brush handles.

Masturbators have also forced in various articles, such as twigs, small wax candles, penholders, nails, pencils, and the like. Catheters and clay-pipe stems, that have been used for purposes of catheterization, have been broken off and left in the bladder.

Pessaries, which have been badly fitted, or worn too long, have passed by ulceration from the vagina into the bladder.

Symptomatology.—The symptoms need not be given in detail, as they are the same as those caused by any foreign body, usually aggravated, however, if the body be sharp and have jagged edges. Bleeding is not uncommon, and pain varies in amount and severity with the kind, size, and shape of the foreign body. Hysterical women have been known to conceal the pain and tenesmus for a long time. If the bodies be small and blunt, they may give rise to but little pain or tenesmus, and, remaining in the bladder undisturbed, form nuclei for calculi. I doubt if a modification of the urinary secretion by reflex nerve influence (excited by these bodies) is necessary to cause incrustation, or form calculi. The hypersecretion of mucus and decomposition of urine is all that is required.

Treatment.—The treatment of a foreign body in the bladder is summed up in two words—*remove it.* This must first be tried through the urethra. A pair of forceps (those known as the alligator forceps being the best) are guided to the object, which is to be seized and removed. If this is difficult, the operation may be done through the speculum. If the bodies be small, they may possibly be washed out. If they are so situated that their removal by the urethra is impossible, vaginal cystotomy may be performed, and the foreign bodies thus removed, using such after treatment as will relieve any cystitis, which may have been produced.

CHAPTER XLVI.

NON-INFLAMMATORY DISEASES OF THE BLADDER (CONTINUED).

RUPTURE OF THE BLADDER.

RUPTURE of the bladder may be classified according to its location and extent, as follows:

I. Complete and incomplete.

II. (*a*) Occurring at a point where the bladder is covered with peritonæum.

(*b*) Where the bladder is not covered with peritonæum.

I. In the complete rupture all the coats of the organ are divided, while in the incomplete variety one coat at least remains undivided.

Pathology.—The complete form of rupture is the most common, and the location at which it most frequently occurs is the posterior and upper part; that is, the part where the walls of the bladder are the thinnest, and probably where there is the greatest exposure to the causes of the injury.

There is another reason given why rupture is more frequent where the bladder is covered with peritonæum, and that is because the peritoneal covering is not so elastic as the other coats.

When the laceration occurs within the limits of the peritoneal coat, and is complete, the urine escapes into the peritoneal cavity, and produces shock and peritonitis, which usually prove fatal.

In rupture at any point not covered with peritonæum, infiltration of urine takes place in the tissues beneath, not within, the peritonæum. This infiltration is sometimes very great, extending from the cellular tissue of the pelvis to the labia and thighs.

The clinical history of these two varieties differs in its characteristics because of the fact just mentioned—that in the one variety the urine escapes through the rupture into the peritoneal cavity, while in the other the urine infiltrates the tissues in and about the pelvis.

In the one, peritonitis is speedily developed, as a rule, and generally proves fatal; in the other, the progress is slower, and the chief danger is from septicæmia. There is another class of cases having a pathological history which holds an intermediate position between the two already described.

In this class the history points to the fact that the rupture has been at a point destitute of peritonæum, or else the rupture has been incomplete, not involving the peritonæum.

This gives rise to symptoms of severe internal injury, but less severe than in complete rupture, which is followed by a sudden giving way and escape of urine into the peritoneal cavity, and subsequent peritonitis. This opening into the peritoneal cavity at a period remote from the injury, is due to pressure or ulceration or sloughing, which completes the rupture.

Symptomatology.—The symptoms of rupture of the bladder are ordinarily developed as follows: There is usually shock in a marked degree, and if the pelvic bones are broken—a frequent complication of this injury—the patient is unable to move after having rallied from the shock. Severe pain is felt in the hypogastric region, and a continual desire to urinate, without the power to void the smallest quantity of urine, or possibly but a few drops mixed with blood. The constitutional symptoms indicate great prostration, which rapidly ensues. The patient has an anxious look, the countenance is pale, the pulse feeble and fluttering, respiration sighing, skin clammy; the abdomen in a short time becomes tympanitic. There is also a rise in temperature after a time, but during the shock the temperature may be sub-normal; delirium, convulsions, and coma may occur, and death may take place in a few hours in severe cases, or it may be delayed a few days. A fatal result occurs sooner in complete than in incomplete rupture.

If the patient survives the shock or collapse, life may be endangered by the development of peritonitis or septicæmia. The physical signs of rupture are few and by no means reliable. I must therefore give more attention to the clinical history and symptoms, incidentally bringing out the only physical signs obtainable, such as the empty state of the bladder found when that viscus has not been emptied in several hours, and the withdrawal of a small quantity of bloody urine by means of the catheter.

The surgeon is not able to make a certain diagnosis in all cases, as the symptoms are not always pathognomonic. The statement of the patient that she received a blow over the hypogastrium, or that while in the act of straining she felt something give way, are valuable as evidence when acute pain and other symptoms of rupture follow.

The evidence obtained from the use of the catheter is of value, especially when it is known that the patient had not urinated for several hours prior to the accident.

Under these circumstances when the bladder may contain a small quantity of bloody urine or when the bladder is empty, there is strong evidence of the bladder being lacerated. But the evidence pointing to rupture is by no means always certain. And again very often signs and symptoms which the diagnostician depends upon most are absent, and those that are present are liable to mislead. This is very unfortunate, but true. The diagnosis is especially obscure when there has been a long interval between the receipt of the injury and the development of characteristic symptoms. It is therefore necessary to watch a patient in whom there is suspicion that rupture of the bladder may have occurred. The symptoms may be for a time concealed and then develop rapidly. The first symptoms may be delayed or be obscure and not attract attention, because the vesical rupture may be involved with other injuries whose symptoms for the time hide the more dangerous lesions. As a rule, it is rare to find any external signs or mark of injury on examination of the abdomen. When much depends on the history given by the patient regarding the nature of the accident and the condition of the bladder at the time, it frequently happens that she is not able to answer questions correctly, because of the shock and the fact that this accident often occurs while the patient is intoxicated.

Strange as it may appear, in exceptional cases the patient may have no difficulty in urinating, and indeed may pass a large quantity of water. Cases have been recorded where the patient regained the power of voluntary urination after the catheter was passed for the first time.

Although it is important to make a diagnosis early in all cases, yet it is of equal importance to know whether the rupture is complete or incomplete. This can be done by noting the fact that in the one case there will be infiltration of the urine into the cellular tissue of the pelvis, and in the other such infiltration is absent.

It is often necessary to pass the catheter both for diagnosis and treatment, and great care should be taken in its introduction, for sometimes by using too much force it is accidently pushed through the viscus into the abdominal cavity.

Prognosis.—The chances of recovery are not favorable, especially when the urine passes into the peritoneal cavity through a rupture high up. When the rupture is incomplete or does not involve the peritoneal coat and treatment is early employed, the prospects of saving the life of the patient are encouraging.

Causation.—The predisposing causes of rupture are certain conditions of the walls of the bladder, such as atrophy, fatty degeneration, ulceration, and sacculation; overdistention from stricture or other causes, and alcoholic intoxication which favors overdistention, and exposure to the exciting causes of the accident. The empty bladder may be lacerated in connection with injuries of the other pelvic organs, but it is a fact that in the majority of cases the bladder has been less or more distended at the time of the accident. It should be borne in mind, however, that rupture has occurred a great many times when the bladder was normal and not overdistended, there being no predisposing conditions present that could be recognized. The most common determining causes are blows over the region of the bladder. These may be sustained in a variety of ways, such as direct blows or knocks, falling from a height upon something which violently strikes upon the hypogastrium. Rupture often occurs in connection with severe injuries which fracture the pelvic veins. In such cases it is not possible to say whether the rupture occurring under such circumstances is due to the direct blow or to laceration by pieces of the broken bones.

Rupture has occurred sufficiently often in the puerperal state to warrant placing this condition in the list of predisposing causes. One can see how a distended bladder might be ruptured during the violent labor-pains or the contortions of instrumental and manual delivery, and this accident has occurred in that way. In a number of cases, however, the rupture has not taken place until after delivery, showing that the labor gave rise to retention, and that to rupture. So far, then, as the puerperal state is related to rupture of the bladder it may be said that a full bladder may be ruptured by the direct violence done during delivery, but quite as often retention occurs in the puerperal state, and the rupture is caused by overdistention. In a similar way rupture has occurred in displacement of the uterus which caused retention of the urine.

The bladder has frequently been wounded during ovariotomy and hysterectomy when there were adhesions, but this accident does not come under the head of rupture now under consideration.

Treatment.—The first indications are to relieve pain and shock if either is present. These objects can be attained usually by opium and stimulants. If there is infiltration of urine into the pelvic cellular tissue the urine should be removed by puncturing or incising the parts affected. Next, and most important of all, the bladder should be continuously kept empty by retaining the catheter in the bladder. The catheter should be a flexible one of soft rubber with a perfect eye very near the end. It should be made to enter the bladder only far enough to secure perfect drainage and not far enough to disturb the wound in the bladder. Vaginal cystotomy has been recommended as a means of drainage, but I feel sure that the catheter is a simpler, and certainly as reliable a means of accomplishing the object. The management of the graver cases, in which the rupture opens into the peritoneal cavity, must be of the most heroic character in order to be effectual.

The great object is to cleanse the peritoneal cavity of urine and blood. This has been done when the case was seen early, by passing the catheter into the peritoneal cavity through the rent in the bladder. When this can be done easily it may answer that purpose, and the patient may be treated by rest and opium; but, unless the catheter passes without much effort and the one catheterization is sufficient, this method should not be persisted in.

Laparotomy appears to offer the best chances in these very formidable cases. If the patient is seen early, and before extensive peritonitis has been established, I believe the best that can be done is to open the abdominal cavity, and thoroughly remove all blood and urine that have accumulated. When this has been accomplished the wound in the bladder should be accurately closed with sutures. In case the edges of the wound are very irregular, and will not fit together accurately, they should be trimmed sufficiently to give a clean and complete coaptation. The after-treatment should then consist in draining the bladder, as already mentioned, and managing the patient as in laparotomy for any purpose.

ILLUSTRATIVE CASES.

Case of Rupture of Female Bladder associated with Abortion (by T. Lawrie Gentles, L. F. P. S. G., Derby).—On October 13th I was requested, at 3 A. M., to visit a woman in a neighboring street, who was said by the messenger (her husband) "to have had a mishap."

On reaching the house I found a well-made woman of thirty-six lying on her left side in bed, vomiting large quantities of a dark-brown, pungent-smelling liquid. The pillows were drenched with the fluid, so also was the carpet in front of the bed, and on the walls opposite to the patient were stains of a similar nature. There was also half a pint of vomit in the chamber-vessel. The woman was in a state of collapse; a cold, clammy perspiration stood on her face, her hands and feet were like ice, and her pulse was imperceptible. There was no one in the house except her husband and two little children, the latter occupying the same bed as the patient; while, to add still more to the ghastliness of the scene, the younger of the children (a babe of nine months) was vainly endeavoring to reach its dying mother's breast in order to obtain its usual nourishment.

I made a rapid examination by the vagina, but found a closed os uteri, and no marked traces of hæmorrhage. I observed, however, that the abdomen was greatly distended. I tried to administer some ammonia, but the patient was unable to swallow; she gave me one agonizing look of dread, moved her lips as if to speak, and then died, the death taking place within a quarter of an hour after my arrival at the house.

My first impression was that the woman had died of internal hæmorrhage; the only things which seemed to militate against this being the redness of the lips and the copious vomiting. This idea of hæmorrhage seemed also confirmed by what the husband said at the bedside—viz., that "his wife had had a good many clots come from her, and that her linen was very much stained."

I refused, of course, to give any certificate, and communicated with the coroner. In collecting evidence for the inquest, the following facts were clearly brought out; first, that the woman was a drinker; secondly, that she had had a drinking-bout for some days; and thirdly, that she had had occasional difficulty in passing urine. In regard to the first two points, the husband's evidence was most conclusive, and showed clearly that when the poor woman had one of her drinking-fits on, she would not only consume large quantities of beer (her favorite drink), but also all the spirituous liquors she could lay her hands on. In regard to the third point, the husband also made clear the fact that his wife had often suffered from retention of urine, but, "so far, had always got over it." At the inquest, further details of evidence brought to light the fact that the woman had complained of pain in her belly for two or three days previous to death. She had, however, been "up and down stairs" until 1 P. M. of the day preceding her death; but when her husband came home at 6 P. M., he found her in great pain, and was told by his wife that "she had been losing blood." A good many clots were in the chamber-vessel, and these he threw away into the ash-pit. The pain getting no better, and finding that his wife was "altering for the worse," he came for a medical man as already stated.

At the autopsy there were no external signs of violence found, except a slight abrasion on the forehead, and another on the lower lip, and a small bruise on the inner side of the right thigh, none of which were of recent date. On cutting through the abdominal walls, the great depth of fat and its extreme "wateriness" arrested our attention, the knife going through the tissue with a distinct "swish." Suspecting an accumulation of fluid in the abdominal cavity, a small incision was made at first. No sooner was this done than a reddish-brown liquid began to well up. Some of this was drawn off, and the opening enlarged, when nearly six pints of fluid were removed. The stomach and intestines, having been carefully examined, were then taken out, in order to facilitate further search for the lesion. The first thing which we noticed was a pint of blood lying in the pelvic basin; and, on making more minute search, a rent was discovered in the posterior wall of the bladder—a rent large enough to admit four fingers. Here, then, was the cause of death. There were some fresh adhesions on each side of the bladder and the pelvic walls; there were also similar adhesions between the bladder and uterus. All these adhesions, however, were extremely soft, and broke with the slightest pressure. The walls of the bladder itself also seemed much thinner than usual. No flakes of lymph could be discovered in the fluid removed from the abdominal cavity, and neither did the peritonæum exhibit any great degree of vascularity. It may be, however, I think, safely affirmed that a large portion of the fluid found was effused from an irritated peritonæum, the other portion of the fluid being, of course, urine from the ruptured bladder.

On opening the uterus, signs of recent delivery presented themselves; on observing which I asked my son to tell the husband to rake up "the clots" from the ash-pit. The husband did so, and one of the "clots" was found to be a fœtus, three inches in length.

Now comes the question: When did the rupture of the bladder occur, and had uterine action anything to do with it? Supposing that the "pains in the belly," of which the woman complained for two or three days before death were the commencement of the abortion, it is reasonable to infer that, when true expulsive efforts on the part of the uterus began, these efforts would be aided by the action of the abdominal muscles; and, supposing still further, that the bladder was at that time distended to its fullest capacity, it is perfectly possible that the pressure of the abdominal muscles would be the "last straw" necessary to produce the fatal lesion. I am, therefore, inclined to think that the rupture took place in the afternoon of the 12th. I ought to have stated that, although, when the husband came home at 6 P. M. on that day he found his wife in bed, she, nevertheless, "kept getting out of bed, trying to pass urine, but could not." There can be little doubt that the alcoholic condition of the patient would rob her of her sense of attending to the calls of nature; and it is melancholy to think that, if she had only been seen earlier, a simple catheterism might have saved her.

As a piece of concurrent evidence of the habits of the patient, it may be stated that the liver was a genuine "nutmeg"; that the kidneys were thoroughly disorganized (the cortical substance being rarely distinguishable); and that the spleen was exceedingly soft. The heart was small and fatty. The lungs were fairly healthy, but there were extensive adhesions in the right pleural cavity. The head was not examined.—*British Medical Journal, January 6, 1883.*

Cases of Rupture treated by Laparotomy.—(A. G. Walter)—Ten hours after a severe injury, no urine was found by the catheter. The abdomen was opened in the linea alba by an incision beginning one inch below the umbilicus and terminating one inch above the pubes, to the extent of six inches. The intestines were found inflated, their peritoneal coat, as well as that lining the interior of the abdominal walls, already showing evident marks of congestion. A soft sponge was then cautiously introduced into the abdomen, with which the extravasated fluid, consisting of urine and blood, was carefully removed from the pelvis and between the convolutions of the bowels, amounting to nearly a pint. A rent was found at the fundus of the bladder, two inches in extent. The cavity of the abdomen being cleansed of the noxious agent, the wound of the bladder was left to itself, as no urine was seen to escape from it. The abdominal wound was closed by strong Carlsbad needles, secured by silver wire (only skin and fascia being stitched, while the peritonæum was left untouched); a flannel bandage encircled the whole abdomen. The patient, awakening from the anæsthetic sleep, felt relieved of pain and the desire to urinate, so distressing before the operation; vomiting did not return; opium in one-grain doses was ordered; abstinence of drink and perfect quietude of body, with retention of the catheter, were strictly insisted upon. He soon began to doze, had a comfortable night, was free from pain the next morning, complaining only of soreness in the abdomen, without tympanites, sickness, or calls to urinate; thirst less urgent. The treatment being vigorously continued, for drinks iced barley-water, water only in very small quantities, with pieces of ice, being allowed. No unpleasant symptom followed; urine in small quantities, but free of the admixture of blood, passing by the catheter. On the third day the intervals between the doses of opium were lengthened to two hours; on the fifth, to three, and thus gradually decreased as all signs of inflammation had passed. At the end of a week the abdominal wound appeared to be closed by first intention; the stitches, however, were not removed till a week later. The gum-elastic catheter was replaced by a new one every two days, and was not withdrawn for two weeks after the injury had been received, and then only for a short time. At the expiration of two weeks, with the absence of all pain and tenderness, opium was omitted. The intestines were relieved by warm-water injections on the tenth day, when mild nourishment was ordered. Between the second and third week the catheter was permanently withdrawn, and only introduced every four hours for the evacuation of urine. After the third week, the patient left his bed. He has remained well, working at his trade, and feeling no impediment in his urinary organs.

(Alfred Willett).—An incision some five to six inches in length, from the umbilicus to the pubes, was made in the mesial line and carried through the parietes. All bleeding points having been secured, the peritonæum was opened, and at once several ounces of dull, brownish fluid, with strong urinous odor, escaped. The intestines were greatly distended, and instantly bulged out through the wound. The peritonæum generally was highly injected, and adjacent surfaces were glued together. Passing my hand into the pelvis I detected a laceration of the bladder. The coils of gut were only slightly more adherent here than in the abdomen proper; I satisfied myself that there was no protrusion of bowel into the lacerated bladder. The omentum was raised from off the intestines, and so much of the latter as lay in the pelvis was drawn up, laid upon the upper part of the patient's abdomen, and protected from harm and chill by flannels wrung out of moderately hot water. There was about half a pint of bloody, urinous fluid in the pelvis, and when this had been sponged away, a rent of the bladder some three and one half inches in extent was exposed. It extended diagonally across the fundus, having a direction from before backward and from right to left. The appearance was that of a nearly straight tear through all the coats of the bladder, except at its most dependent parts, where it was jagged and uneven. The bladder was flaccid, but, of course, quite empty, and at the site of rupture its walls were fully half an inch in thickness. I brought the torn edges easily in apposition, and united them by eight interrupted sutures of fine Chinese silk. The sutures were placed at intervals of rather less than half an inch, and seemed to close the rent completely. Before returning the intestines I cleaned out the abdomen as thoroughly as I was able; but the mesentery of the gut lying outside the abdomen acted as a transverse diaphragm, and I was disappointed to find on replacing these coils that some of the fluid had been pent up above it. Owing to gaseous distention, very considerable difficulty was experienced in replacing all the intestines within the abdomen, and I was quite unable to introduce my hand and cleanse the upper part of the peritoneal cavity as satisfactorily as I could have wished; but the patient's shoulders were raised in order to make the pelvis more dependent, and all fluid that found its way there was removed. The intestines that had been lying out of the abdomen during the operation were sponged over with warm water and carefully cleansed before returning them. So extreme was their distention that to enable me to introduce sutures, and close the external wound, Mr. Langton, who assisted me, was obliged to spread out his hand and restrain the bowels from forcing their way through the wound, withdrawing his hand gradually as the successive sutures, also of Chinese silk, were tightened. Through the lower angle of the abdominal wound I passed a carbolized drainage-tube into the pelvis, securing it to the edge of the external wound, which was then dressed precisely as after ovariotomy. A Thompson's catheter was introduced and retained in the bladder. On being replaced in bed, hot bottles were placed beside the patient, and he was well covered up. The wound in the abdominal parietes was found on the autopsy to be adherent almost along its whole line; not much swelling of abdomen. The intestines immediately behind the wound were adherent to it. All the coils of intestine in the lower half of the abdomen were adherent to each other and to the abdominal walls by recent lymph. The intestines in contact with the bladder were adherent to it. There were about two ounces of bloody fluid at the back of the peritoneal cavity; about an ounce of this lay just above the bladder. The opening in the bladder was everywhere well closed, except between the posterior two stitches, where there was an orifice through which water injected per urethram escaped very freely. Even here there appeared to be an attempt at repair. Elsewhere the edges of the wound were adherent. There was very little sign of inflammation in the interior of the viscus.

(Christopher Heath).—Man, aged forty-seven. Pubes being shaved and washed with carbolic lotion, an incision was made in the middle line just above the pubes for two inches, and the tissues divided down to the peritonæum, which appeared blue, the recti muscles, which were firmly contracted, being held aside by retractors with difficulty. The peritonæum was then picked up and a cut made into it, when a gush of fluid, like that drawn off by the catheter, came out. A large quantity of clots was then taken out from the peritoneal cavity. The finger introduced into the peritoneal cavity found a long rent in the posterior wall of the bladder high up. This was sewed up by a continuous catgut suture firmly tied at both ends. The clots were removed as far as possible from the peritonæum, and the cavity sponged out after injection with warm water, and a long large-sized drainage-tube was inserted at the lower angle of the wound, the upper part of the wound being brought together by deep and superficial sutures. A catheter was passed into the bladder, to which was afterward attached some India-rubber tubing leading into a vessel under the bed. Hot poultices were applied to the abdomen, and one grain of opium was administered every four hours. The further history shows great relief and improvement, but on the fourth day after the operation the patient became rapidly worse and died. Autopsy.—Small intestines considerably distended. For two inches around the abdominal wound the intestines were adherent by recent lymph to each other, and to the abdominal parietes. Above and on each side of these adhesions there was no trace of peritonitis. On tearing away these adhesions some coils of intestines were seen lying over the pelvis glued together, and to adjacent parts by recent blood-stained lymph. On lifting these coils upward, the recto-vesical pouch of peritonæum was exposed, containing about six ounces of clotted blood, black in color, and moderately offensive odor. There was a rent in the mid line of the posterior wall of the bladder two inches in length, extending upward as high as the apex. The lower third of the rent was gaping; the edges of the rest were approximated by the catgut suture, the lower end of which was free and loose.

CHAPTER XLVII.

NON-INFLAMMATORY DISEASES OF THE BLADDER (CONTINUED).

NEOPLASMS, HYPERPLASIA, ATROPHY.

OWING to the very imperfect facilities for observing the internal surface of the bladder during life, the study of vesical neoplasms up to within a few years was chiefly post-mortem, and of course their therapeutics was almost nil. At the present time, however, by means of the endoscope, the microscope, and the operation of cystotomy, more accurate methods of diagnosis and of rational and successful treatment have been developed.

The neoplasms of the bladder may be classified as follows :

Benign.—Myxoma, fibroma, myoma, myo-fibroma, tubercle.

Malignant.—Epithelioma, encephaloid, scirrhus, sarcoma.

Tumors of the bladder and deposits in its walls are by no means common, and those of a benign nature are less common than those that are malignant. There has been some dispute as to whether some of these neoplasms are malignant. This is especially the case in regard to the villous growth, the German and some English authorities ranking them as essentially malignant, while some American authors, as Van Buren and Keyes, deny *in toto* that they have any such property. More will be said of this when I come to the class in which I have placed them ; not that I am satisfied that they are malignant, but for lack of positive evidence of the new idea, temporarily at least, I adhere to the old one.

Benign Growths.—Myxomata, Mucous Polypi, and Polypoid Hypertrophies, while having nearly the same anatomical characters, are really different affections as regards etiology, symptomatology, prognosis, and treatment.

Mucous polypi are isolated hypertrophies of the mucous membrane, varying in size, and giving rise to trouble only in proportion to their size. They may exist at birth, or be developed at any time during life, being more common, however, in youth and middle age. The mucous membrane covering them is thickened and pulpy, and that about their base and in their immediate neighborhood is somewhat thickened, and more vascular than normal. If the polypi are situated at or near the neck, or in other portions of the bladder, where their long, narrow pedicles admit of a blocking of the urethra, the entire mucous membrane of the organ suffers, as in all cases of retention and decomposition of urine. If the obstruction is great, and the organ requires spasmodic and irregular muscular effort to empty it, there will be, sooner or later, not only cystitis, but muscular as well as mucous hypertrophy.

These growths may be as small as the head of a pin, or as large as a goose-egg; they consist of hypertrophied and hyperplastic connective tissue, covered by soft, pulpy, hyperplastic mucous membrane, that bleeds easily on touch. They may coexist with uterine fibroids. Their favorite seat is the posterior wall of the bladder.

General polypoid hypertrophy of the mucous membrane consists in an irregular thickening of the mucous membrane throughout, accompanied as a rule by hypertrophy of the muscular and serous coats. There is an increased blood-supply, the membrane being bright red in color, the capillaries dilated, and the whole mass bleeding easily on the touch. It has somewhat the appearance of fresh granulations. Upon the free surface of the mucous membrane, there is, as we should expect, an excessive cell proliferation, these cells being in a transitional condition, i. e., occupying the position between imperfect and perfect, and not all of the same degree of perfection or imperfection of development. There may be either serous or gelatinous infiltration, giving it a heavy, sodden look. Upon the surface are often found incrustations of the urinary salts.

It appears to me that there has been an undue complexity of classification of this subject, especially among the German pathologists, some of whose differences are too minute to be of any practical value from either a pathological, diagnostic, or remedial point of view. Tumors which they call villous or papilloma vesicæ are, in many, if not all respects, identical with the so-called polypoid hypertrophy of the vesical mucous membrane. For all practical purposes they are essentially the same.

They have been described as enlarged papillæ, the vessels of which are dilated, and their walls thinned. They only differ from the polypoid hypertrophy in increase of vascularity, and the fact that they are usually limited to the trigone. Underlying and about them is a thin, wavy stroma of connective tissue, that becomes increased as the disease advances.

The surface of these growths varies very much in different cases; in some looking like large granulations, in others having more body, being more compact, and looking somewhat like a raspberry or mulberry. Occasionally, they are slightly pedunculated. Their surface has an epithelium resembling the superficial layer of the bladder, unless proliferation is very rapid, when the cells lose their identity, and take a multiplicity of forms, to which may be attributed, perhaps, their having sometimes been mistaken for cancer cells when found in the urine. Fatty degeneration of the most superficial cells is by no means uncommon. As the villi increase in size and number, the connective-tissue stroma, while increasing about their base, diminishes in the prolongations themselves, leaving little besides a mass of tortuous, thin-walled, dilated vessels hanging free in the bladder. The rest of the mucous membrane is usually soft and hyperplastic, and, if there be any stoppage to the free outflow of urine, inflammation may coexist, with incrustations, and possibly dilatation of the ureters. The muscular coat is also usually slightly hypertrophied.

Fibroid tumors and myo-fibromata are very rarely found in the bladder. When they do exist they have all the characters of the fibroma or myo-fibroma found elsewhere, and give rise to the same changes in the vesical walls and ureters that other tumors do, viz., retention with hypertrophy, or dilatation, cystitis, and inflammation of the ureter. They may have their seat in any part of the bladder-wall, and occur at any period of life.

Symptomatology.—The symptoms of vesical neoplasms are divisible into local and constitutional; the former being by far the more important. The local symptoms, if the tumors be of any size, are those produced by a foreign body in the organ, viz., irritation, and sooner or later inflammation.

Obstruction to urination sometimes occurs when the tumors are in a position to block the urethra, and by the sloughing off or detachment of small fragments, which may or may not be incrusted. These are forced into the urethra, and obstruct the outflow of urine.

Pain in one form or another is almost always present. It may consist of a simple uneasiness in the hypogastric region, or amount to actual pain. It may have its seat in the hypogastric region in the perinæum, or more rarely at the end of the urethra. It may also be felt in the loins, or along the thigh and knee. It is usually more intense, as all the symptoms are, during the menstrual flow. This is not so in all cases.

Frequent urination and vesical tenesmus are as a rule present.

but are not proportionate to the size of the tumor, a very small neoplasm often giving rise to most intense spasm.

Hæmorrhage is by no means infrequent, and in some cases is very severe and not readily checked; in others it is slight, simply tinging the urine or imparting to it a smoky appearance, that is characteristic of the presence of a small amount of blood or blood-coloring matter in acid urine. When the hæmorrhage is extensive, and the bladder is distended by the fluid or clotted blood, retention of urine is apt to occur, and sometimes obstructive suppression, that may lead to most serious results.

Hæmaturia is as liable to occur with the benign as with the malignant growths, and consequently is of little value in differential diagnosis. The effects of prolonged or repeated hæmorrhage upon the constitution are often most serious, and the patients are apt to be anæmic and also cachectic in appearance. I have had one case in which hæmorrhage was the only symptom present.

The presence of the foreign body in the organ soon gives rise to inflammation, which is seriously aggravated if retention accompany it. The urine is then found loaded with mucus, muco-purulent or purulent matter, epithelial scales, tissue shreds, bits of tumor, and the triple and amorphous phosphates.

Intense and repeated vesical tenesmus aggravates the inflamed condition of the membrane, and after a time leads to muscular hypertrophy and increased hæmorrhage.

In these cases, as in cystitis from any other cause, dilatation of the ureters, with a traveling upward of the inflammation and destruction of the kidney, may result. This dilatation and the evil after-results are more apt to occur if the neoplasm be of sufficient size to obstruct the free outflow of urine, as at every spasmodic and forcible contraction of the hypertrophied organ some urine is dammed back in the ureters, dilating them gradually. When the ureteric openings are dilated, so that urine regurgitates at each vesical contraction, serious lesions result, as ureteritis, pyonephrosis, renal abscess, or, if the process be slow, gradual renal atrophy, uræmia, and finally death.

The general system may or may not suffer severely for a long time. In most cases it does. The usual train of symptoms, such as loss of sleep, disorder of digestion, sweating, and blood contamination are developed in regular sequence. The patients become thin, and have a worn, anxious expression, and, as I have already said, are apt to be both anæmic and cachectic.

If renal troubles complicate this affection, casts, renal cells, and albumen may appear in the urine. In renal abscess-atrophy, or pyonephrosis, however, the urine may be examined for weeks without showing any renal tissue, casts, or epithelium, there being simply an abundance of pus.

Diagnosis.—The diagnosis of vesical neoplasms is made chiefly by physical signs. The methods employed in their investigation may be arranged under two heads.

Direct.—Bimanual touch, speculum, endoscope, curette, catheter, palpation.

Indirect.—Urine.

Direct.—An intelligent employment of the methods classed under the first head is all that is necessary to make a clear diagnosis in some cases. The bimanual touch will reveal the presence of the tumor, if it is of any great size, and also its size and fixation in one place. This fixed position is of much importance as distinguishing a neoplasm from other foreign bodies, stone, for example, which is movable, and can be pushed from one side of the bladder to the other. The use of the endoscope will show at once the appearance of the tumor, if it is favorably located, and by scraping away a little with the curette (through the speculum), its nature may be discovered by a microscopical examination.

The use of the catheter or finger in the bladder, or one in the bladder and the other in the vagina, may be resorted to in cases where the diagnosis is difficult. But these are extremely painful manipulations, are not free from danger, and, consequently, should not be resorted to unless there is failure by other means.

Indirect.—An examination of the urine in these cases will lead to the suspicion of the presence of some neoplasm in the bladder, from the occurrence of tissue shreds and bits of the tumor in this fluid. A piece of tumor will sometimes become detached and be expelled with the urine, and by careful searching it may be found. This can be placed under the microscope, and thus the examiner may be able to tell exactly what kind of a growth exists.

Prognosis.—With our present means for exploring and operating upon the inside of the female bladder, the prognosis of benign neoplasms is very good, if the operation for removal be performed early enough in the disease. Operation, however, at any time gives promise of good result.

There is danger of relapse, as we learn from the cases of Simon, Hutchinson, and others. If the operation be carefully done, even incontinence of urine may be avoided, and complete, and permanent recovery follow. Without operation patients have lived as long as nineteen years, in some cases suffering but little; and it may be well to say that not all of these cases are accompanied by cystitis, a little pus and blood in the urine at intervals, with occasional fragments of tumor, being all that is found.

Causation.—The causes of these neoplasms are very obscure; indeed, no definite facts can be adduced in favor of any of the causes given by the various authors. Some speak of them as due to the irritation of calculi, calculous fragments, and incrustations. These, however, may be readily secondary to and produced by the neoplasm, being the effect rather than the cause. Moreover, it is known that while persons carrying foreign bodies of various kinds in the bladder for a length of time are very apt to have cystitis, neoplasms are seldom found, and are very rare under any circumstances.

Some authors look—with a show of reason, I think—to the irritation from blood transudations into the bladder-walls as a cause. This is borne out by two well-authenticated cases occurring one in the practice of Hutchinson, of England, the other in that of Winckel, of Germany. The etiology of these neoplasms needs further careful study before any cause or causes can be pronounced upon with certainty. The free and intelligent use of the modern means of physical exploration in all affections of the female bladder will in a few years throw much light upon this subject.

Treatment.—There is really but one form of treatment for these benign neoplasms, viz., removal. The treatment of ulcerations and small neoplasms of the urethra and bladder has been completely revolutionized within the past five or six years. The changes that have been made are, in my opinion, all for the better. I now use the galvano-cautery, instead of strong caustics that were employed in days gone by. Strong caustic injections for ulceration of the bladder and urethra, and similar applications to new growths, were always unsatisfactory. They caused no end of suffering and often failed to relieve or cure, and, when successful in arresting disease, scar tissue followed that was troublesome—many times extremely so. The great objection to the use of caustics for the purpose of destroying diseased tissue is that the effect can not be controlled. If one destroys all of the diseased tissue some of the normal tissue is sure to be scorched, and if one guards against the latter he fails in the former.

The advantages of the cautery in treating ulcers and neoplasms are that its action can be thoroughly controlled. Morbid growths and diseased or ulcerating tissue can be completely destroyed, while the normal tissues are left uninjured. The line of demarkation between the charred and normal tissue can be sharply defined by the operator, and the healing process goes on rapidly and without pain. By the time the eschar separates the parts beneath have become sufficiently repaired to withstand the contact of urine, and so the recurrence of inflammation or ulceration is guarded against. When the cautery can be properly used the results are very gratifying. There was much trouble in getting at new growths, ulcers, and fissures at the neck of the bladder, especially until Kelly introduced his method; but after that I found the cautery could be used at any point that could be brought into the field of the endoscope. In treating neoplasms a fine cautery point is used, touching repeatedly the parts until all new or diseased tissue is destroyed. For ulcers a flat point is used, passing it over the diseased surface in about the same way that one would apply a solution with a pencil. Of course, small neoplasms and ulcers only can be treated in this way. Since adopting this plan of treatment I have been able to cure cases of cystitis with ulceration and vascular proliferations that formerly baffled me completely. Such cases could only be relieved by drainage through a vesico-vaginal fistula, which Emmet taught us to establish in bad cases. A full description of the apparatus I employ is given by Mr. Pignolet on page 429.

The treatment of large tumors of the bladder has hitherto consisted in doing suprapubic cystotomy and removing the neoplasms with the scissors or curette, controlling the hæmorrhage by pressure or styptics, and then draining. The results have been very unsatisfactory. Some patients did not recover, and those who did required a long time to do so.

There certainly was room for improvement in this, and I have tried to do better by adopting a new way, which I desire to submit for your judgment, and that is compression and desiccation with electric heat. The process consists in seizing the tissues to be treated—the base of a vascular tumor of the bladder, for example—in a clamp or forceps, and then heating the inner side of the blade of the forceps with electricity to a degree sufficient to desiccate the tissues under pressure, thus arresting all hæmorrhage and reducing the stump to the smallest possible size.

The after-treatment consists in washing out the organ thoroughly yet carefully with warm water to which may be added salicylic acid (1 part to 60). The pain may be controlled by opium, either by the mouth or rectum. The urine should be kept slightly alkaline, and under no circumstances allowed to remain in the bladder long enough to decompose and irritate or overdistend it.

If the tumor is too large to admit of removal *per urethram* Simon's operation should be resorted to. Also in cases where the tumor is so situated as to be beyond the operator's reach through the urethra. I have already fully described this operation. A T-incision is made into the anterior vaginal wall, the bladder opened, inverted through the opening, and the tumor is thus brought into easy position for any operative procedure. When removed, its base may be cauterized, and the bladder replaced. When the surface has entirely healed, the wound in the vesico-vaginal septum may be closed. Union soon takes place in most of these cases, if not interfered with. The after treatment should be the same as when the tumor is removed through the urethra.

I need hardly say that when the general system is below par, it should be attended to.

Polypus of the Bladder.—Dr. Godson showed a polypus which he had recently removed from a woman aged sixty, who was under his care in St. Bartholomew's Hospital. He first saw her a year ago, when she complained of bleeding from the vagina. The uterus and vagina were found healthy, there had been no recurrence of the hæmorrhage until a week since when the patient again presented herself. On examination a tumor the size of a walnut was found at the orifice of the vagina. It had at first sight the aspect of a firm fibrinous clot; it was discovered, however, to protrude from the urethra, and to be connected by a narrow pedicle with the fundus of the bladder, which organ it partially inverted. Dr. Godson applied a catgut ligature, and separated it with scissors. A microscopical examination showed it to consist of fibro-cellular tissue, with a few muscular fibers covered over with mucous membrane. Such polypi are of extreme rarity, and it was fortunate that the subject of it was a woman.—(*Obstetrical Journal, April 1879, p. 28*).

Excision of Papilloma of Bladder.—M. C., aged thirty-four, was admitted to the St. Mary's Hospital, under the care of Mr. Norton, suffering from the effect of long-continued hæmorrhage of the bladder. On examination *per urethram,* a tumor one inch square, coated with phosphatic calculus, but not much raised above the mucous membrane, was discovered occupying the trigone about half an inch from the sphincter. It was evident that the tumor must be removed, and the patient submitted to the risks attendant upon a severe operation, or she must be left to endure the tortures brought about by the contractions of the bladder upon the growth after micturition, and with the certainty of an early death from hæmorrhage or from blood-poisoning. It was impossible to remove the growth through the urethra, and it was decided to cut the mass away by opening the vagina. It was considered that the growth could not be cleared without cutting through the urethra, and the operation was performed as follows: The spring-scissors were inserted, one blade into the bladder nearly up to the tumor and the other into the vagina, and closed; the front wall of the vagina was then incised centrally to within half an inch of the uterus, and the vaginal wall, which was found not to be incorporated with the growth was dissected from the bladder; the growth was then seized with the vulsellum forceps, and drawn forward, and was then excised by the scissors and removed. Bleeding was averted by the actual cautery, and the lateral flaps of the vagina approximated by sutures. To prevent further hæmorrhage a catheter was inserted, and the bladder compressed by plugging the vagina; no hæmorrhage of importance took place. The temperature remained below normal, and the pulse rose to 120. Severe vomiting persisted until the tenth day after the operation, when she was considered out of danger. On the twelfth day, when apparently in health, she vomited, and shortly afterward fell asleep, in which sleep she died from syncope. At the autopsy the wound was green, and sloughing upon the surface, but healthy immediately beneath. No peritonitis or cellulitis was present, or any thrombosis of vesical, pelvic, or iliac veins. A microscopical examination showed the tumor to be a papilloma. Since writing this case Mr. Norton had operated upon a second case of tumor of the bladder, which had completely recovered from the effects of the operation.—*The Medical Press and Circular, May 14, 1879;* and *Medical Record, July 26, 1879, pp 82 and 83.*

Tubercle of the Bladder.—Tubercle of the female bladder is a comparatively rare affection. Winckel, of Germany, in 2,505 autopsies, found it but four times. Though not often existing as an accompaniment of pulmonary tuberculosis, it does not occur alone, but is usually accompanied by similar deposits in the intestines, kidneys, liver, and elsewhere. It is usually found in early life, though cases have been recorded where it occurred as late as the sixty-fifth year.

The favorite site for its first appearance is at the vesical neck, or about the meatus urinarius, these places being rich in minute glands and follicles. The deposits appear as minute white or yellowish white points on a red, indurated base. After a time, owing to their coalescing and breaking down, large spots of ulceration result.

With these deposits in the bladder there are very apt to be similar deposits in the kidneys and ureters, giving rise to destruction of the former and tubercular pyelitis in the latter.

Symptomatology.—The symptoms are at first those of irritation, and later of true cystitis, with ulceration, induration, and hypertrophy.

Diagnosis.—The diagnosis may be made by means of the endoscope, if there is opportunity to make early and repeated examinations. If by chance the deposits are located at the neck of the bladder, where they can be seen and watched going on to ulceration, the diagnosis is not impossible. The history of the case and the presence of the tubercular diathesis will also aid in the final conclusions. The urine examined by the microscope is found to contain a granular matter mixed with the pus of cystitis which is sooner or later produced. In case the microscopist is fortunate in finding the bacillus tuberculosis the diagnosis is sure.

Prognosis.—The prognosis is bad, as there usually exists serious trouble of the same nature elsewhere, and as local treatment accomplishes very little, the end comes much sooner if the kidneys and ureters are involved in the disease.

Treatment.—Local treatment is out of the question, except such as may allay the irritation or inflammation to a certain extent, and prevent undue pain and spasm. This is not readily done. Daily cleansing of the viscus with warm water; opium, and belladonna suppositories, or enemata of atropine, are the best methods of treatment.

Warmth, attention to diet, general tonics, cod-liver oil, and the various remedies used in phthisis pulmonalis should be advised.

Malignant Growths.—These are not common, although occurring more often than the benign growths. They are usually secondary, and may be of different varieties, as sarcoma, scirrhus, encephaloid, epithelial, villous, and even colloid cancer. Sarcoma, scirrhus, colloid, and epithelial are very rare; encephaloid and villous are more common.

Symptomatology.—The symptoms are the same as those of the benign tumors, differing only in the greater extent and severity of the pain, and, as a rule, less hæmorrhage. The condition of the general system is usually low, the patient soon becoming feeble and cachectic. Cancerous deposits in the kidney and extension of the inflammation up the ureters, may produce renal destruction and consequent uraemia.

Diagnosis.—The only means of making an absolute diagnosis is by using the endoscope, and removing a bit of the tumor with the curette, and submitting it to a microscopical examination. Sarcoma and scirrhus may exist either as distinct tumors or as diffused indurations. The encephaloid variety usually grows rapidly, and is very soft, and easily broken down. I have already said that cancer of neighboring organs may open into the bladder and produce most serious results, sooner or later involving the bladder-tissue in the destructive process. In any case, adhesion to the neighboring organs takes place, and the disease is liable to extend. Thrombosis of the veins of the vesical neck is apt to occur and lead to embolus elsewhere. Peritonitis is a frequent accompaniment.

The favorite seat of cancer, especially of the villous form, is at the trigone. Some authors deny the existence of villous cancer, saying that it is simply a luxuriant growth of vesical papilloma, and base their opinion upon the nature of its structure and certain facts in its clinical history. "They never lead to secondary cancerous deposits elsewhere. They do not spontaneously ulcerate. The lymphatic glands are not implicated. There is no characteristic cachexia. When they kill, death seems due purely to loss of blood and exhaustion from pain."—*Van Buren and Keyes, p. 257.*

Most German authors claim that this growth is malignant, and think that in drawing deductions, such as I have given above, the observers saw only cases of simple non-malignant papilloma.

Causation.—Nothing is known about the causes of malignant disease of the bladder, except that which is known about malignant disease elsewhere, consequently, that subject need not be discussed here.

Treatment.—If the disease is not too far advanced, extirpation or breaking down of the tumor may be advisable, but except in the case of epithelioma, and the so-called villous cancer, but little good is to be hoped for.

When removal is not advisable, we must look to narcotics and tonics to prolong the patient's life and relieve the intense pain and tenesmus.

If the tumor is generally distributed throughout the bladder, or has its origin in a neighboring organ, extirpation is out of the question.

Sarcomatous Tumor of the Bladder.—Dr. L. A. Stimson, at a society meeting, exhibited a tumor of the bladder removed from a gentleman sixty-three years of age. When admitted to the Presbyterian Hospital in the early part of October, the patient complained of frequent and painful passage of bloody urine. His first attack occured in the early part of July, and two or three weeks after a fall from a buggy.

For the previous four years he gave a history of attacks of so-called bilious colic, which in connection with his bladder trouble gave rise to the suspicion, in the mind of Dr. Stimson, of renal colic, and the possible existence of vesical calculus. After unavailing efforts to reduce the irritability of the bladder the patient was sounded for stone with negative results. A subsequent examination was also of a negative character. The use of the searcher was followed each time by blood in the urine for two or three days consecutively. Examination *per rectum* revealed enlargement of the prostate, and fulness and doughiness about the bladder, which condition was supposed to be due to cystitis. The existence of a tumor was suspected, but the suspicion could not be confirmed, inasmuch as the condition of the patient forbade bimanual exploration. Ruling out the probability of the existence of a tumor of the bladder, pyelitis was thought of as a cause for his trouble. The patient died rather suddenly without a positive diagnosis having been made. At the autopsy, and before the body was opened, bimanual palpation was performed, and the existence of a tumor was made out. On opening the bladder the morbid growth, which proved to be a sarcoma, three inches in diameter, was attached by a pedicle as thick as the finger to the posterior surface of the bladder, about four inches above the neck of the organ.

HYPERPLASIA.

Hyperplasia of the bladder may be partial or total; may be confined to the muscular, mucous, or connective tissue. In using the term hyperplasia reference is usually made to an increased thickness of the muscular walls alone. There usually coexists with this condition (which is partly hypertrophy, partly hyperplasia) increase in thickness of the various other structures of the organ. This may or may not be the case, and when existing it is more hyperplasia than hypertrophy. The terms partial and total have been used to convey the idea of hypertrophy of a part or parts of the muscular tissue, and do not usually refer to the number of coats involved. The truth is, however, that one part of the muscular tissue of the organ seldom becomes hypertrophied to any extent without involving the other parts; the increase in one part simply being greater than in another.

This affection is much less frequent in the female than in the male, owing to her exemption from the more common causes of it. Any obstruction to the outflow of urine, as tumors of the urethra or bladder, partly or wholly blocking the passage; cystocele, by preventing complete evacuation; inflammatory or nervous troubles, causing unusually active muscular contraction, continuing for some time; all these may produce muscular hyperplasia. Inflammation of the mucous membrane is almost always present; sooner or later, that membrane becomes to a certain extent thickened, and may go as far as the production of tufty, polypoid hyperplasia. Van Buren and Keyes state that Civiale mentions hypertrophy, chiefly of the anterior vesical wall, due to chronic inflammation or tubercular infiltration—evidently not simple hypertrophy.

As the production of hypertrophy is almost always due to some obstruction to the outflow of the urine, dilatation after a time occurs, producing eccentric hyperplasia. When dilatation does not occur, but hyperplasia alone, the condition is produced which is known as concentric hyperplasia. In these cases of muscular hypertrophy in which great force is required to expel the urine, pouches are sometimes formed, usually at the inferior fundus, caused by the pushing of the mucous membrane between the enlarged muscular fibers. These diverticula are comparatively rare in the female. A sagging or dislocation of the entire posterior inferior bladder-wall need not be discussed here, as it has been already disposed of.

Symptomatology.—In concentric hyperplasia there is usually vesical spasm, some pain, and forcible ejection of urine. A certain amount of cystitis almost always accompanies this affection, and surely aggravates the original disorder, by which it is itself further aggravated. In the eccentric form the symptoms are almost the same, there being sometimes superadded those of overdistention.

Diagnosis.—This is readily made by introducing the finger into the vagina and the sound into the bladder, by which means the capacity of the organ can be measured and the thickness of its walls ascertained. It is not unusual in the concentric form for the sound to be forcibly expelled from the bladder by a sudden contraction of that organ. The capacity of the viscus can be further measured by noting the amount of urine passed at each micturition, or by injecting into it some bland solution, such as salt and lukewarm water.

Treatment.—The treatment must be directed to the removal of the cause when that is possible. If due to stricture of the urethra or the presence of tumors, their removal is to be considered; if to cystocele, replacement, and retention in place by a proper pessary, and other measures of which I have spoken fully in a previous chapter, must be adopted.

When existing in the eccentric form an abdominal belt, cold baths, cold douches to the hips, astringent injections into the bladder, and electricity, should be tried, having first, where possible, removed the cause, and palliated or cured the aggravating complications. Daily catheterization, in cases of obstruction to the outflow of urine, or where, without obstruction there is liability to overdistention, is of great importance, and should be practiced.

ATROPHY.

So far as I know this is not a common disease. Its recognition during life being by no means easy, and but little attention being paid to the bladder in autopsies, very little knowledge of its frequency is had. I am inclined to believe, however, that it exists oftener than is commonly supposed. Its causes may be ranged under two heads, viz., constitutional and local.

Constitutional.—In most women from fifty years of age upward a degenerative change takes place in the bladder, as in the other pelvic organs, and this is a perfectly natural process. In this condition the several coats are found proportionally changed, the three sometimes forming a wall not much thicker than fine writing-paper. This, however, is extreme and uncommon. The process causing atrophy is one of fatty and granular degeneration, and often at this age the epithelial cells of the bladder found in the urine are fatty and granular, as is also the case in both the vesical and vaginal epithelium of some women just after parturition.

Walls thus thinned by the degenerative changes of age are of course much more liable to be still further altered by various causes, such as paralysis or overdistention. Winckel attributes the cystocele of aged women to atrophy of the bladder-walls, and the resulting retention of urine.

In soft, flabby and debilitated women, and also in men, an atrophied condition of the bladder-walls often exists, and may lead to rupture. "Bonnet, Hauf, and Hunter (quoted by Pitha), give examples of sudden rupture of the bladder in young persons from this cause (atrophy). Civiale gives the caution of avoiding pressure on the bladder-walls during catheterization, for fear of perforation." —*Van Buren and Keyes.*

Local Causes.—Extreme distention of the bladder, leading to temporary or permanent paralysis, or paralysis with resulting overdistention, may lead to fatty degeneration and atrophy, as well as inflammatory trouble. Interrupted nutrition, due to shutting off the circulation, is the usual method of causation. Nutritive changes may also be due to lack of, or to perverted, innervation caused by disease or injuries of the spinal cord. When atrophy occurs in women under fifty years of age, who are in otherwise good health, and of good constitution, I believe that it is due to habitual overdistention of the bladder from retention of urine.

Treatment.—Daily use of the catheter, strychnia in pretty full doses, electricity, building up of the general system, and gentle washing out of the organ with warm medicated solutions, may be tried. But little can be done when the degeneration is due to age.

Atrophy of the Bladder from the Habit of retaining the Urine for a Long Time.—The lady was thirty-three years of age, large, and well developed, except that her heart and arteries were rather small. Her uterus was also undersized. She began to menstruate at fifteen years of age, and her menses were irregular in recurrence and duration, and always attended with pain. Early in life she became a school-teacher, and had followed that profession up to the time that I saw her. She fell into the habit of retaining her urine for long periods, and for several years urinated only twice in each twenty-four hours. For some time she had noticed a growing difficulty in emptying her bladder, and five months before consulting me she found that she had lost the power of urinating altogether. Her physician used the catheter regularly for a time, and then taught her to use it herself. Under this treatment, with tonics and sedatives, she gradually regained a partial control of her bladder; but with it came an irritable condition of that organ and the urethra, which caused an almost constant desire to urinate.

When I examined her I found slight prolapsus of the base of the bladder, and, by passing a sound into it, and a finger in the vagina, I found the posterior bladder-wall quite thin. There were also indications of a slight catarrh of the organ, doubtless brought on by the continued overdistention and prolonged use of the catheter. She told me that she had to make strong efforts to pass urine, and that it came away in interrupted jets.

My impression of this case is, that her constant neglect of the bladder function caused overdistention, which led to atrophy and further distention. The use of the catheter permitted the organ to partially regain its muscular power, and also excited some catarrh. Passing the urine in spurts or jets was due, I presume, to the voluntary muscular efforts.

CHAPTER XLVIII.

PATENCY OF GÄRTNER'S DUCT.—DISEASES OF THE URETHRA AND URETHRAL GLANDS.

It is now generally conceded that Gärtner's duct may remain patent after birth. This condition must be very rare, but its rarity makes it very difficult of recognition when it does occur. The following case is illustrative of this anomaly, and is given in detail with the hope that it may be of service to some practitioner in arriving at a diagnosis. With this in mind, other cases that have been regarded as suffering from incurable "incontinence of urine" may be permanently cured.

ILLUSTRATIVE CASE OF PATENCY OF GÄRTNER'S DUCT.

The patient was nearly fifteen years of age, very large, well developed, and in perfect health of body and mind, but all her life had been greatly annoyed by a constant watery discharge from the urethra. The exact amount of the discharge could not be estimated. That it was considerable may be inferred from the fact that it kept her underclothing wet all day, and saturated a protecting napkin at night.

She retained her urine the normal length of time; urinated freely and without pain or discomfort. The discharge from the urethra was not modified in quantity by the erect or recumbent position, nor by the empty or distended condition of the bladder. The most careful examination of all the pelvic organs revealed nothing abnormal, excepting a slight ridge or fold of mucous membrane in the vagina on the right side anteriorly. This elevation or ridge ran from the upper third of the urethra upward to the junction of the vagina and cervix uteri.

Its presence attracted my attention, but did not impress me as anything of importance. The urethra was rather short, but normal in every way, and the urethral ducts also; and I presumed that the muscular tissue might be defective at the neck of the bladder, and hence there might be a slight incontinence. This, however, was not sustained by the clinical history. The patient was admitted to my sanatorium, where I was able to investigate the case thoroughly.

Under the observations of a skilled nurse it was determined that the discharge came from the urethra and that there was no leaking from the bladder. I then suspected that there might be an irregular implantation of one ureter. A cystoscopic examination was made, and both ureters were found in their normal position and were performing their function all right. Double bladder was thought of, with a communication between the one into which the ureters entered and the other. This idea was abandoned, because no known derangement of development could eventuate in such a malformation. Being unable to find any cause for this discharge in any lesion of the bladder, I examined the fluid and found that it contained a very few epithelial cells and a trace of albumin, but none of the constituents of urine. It was not urine at all, as had been supposed. A number of endoscopic examinations of the urethra were made at different times in the hope of finding the opening into the urethra, with most discouraging results. Finally, on one occasion, after making a prolonged exploration (with a fine probe used through the endoscope) of the upper part, I withdrew the instrument a very little way and observed a jet, as fine as a hair, of clear fluid. The discharge had been stopped by the pressure of the endoscope, and on the removal of the pressure the discharge came with force enough to make it visible. I then tried to introduce a probe into the opening, but that was impossible, owing to its small size. The opening, I observed, was at the place where the small ridge in the vagina joined or disappeared in the wall of the urethra. I at once concluded that this ridge contained a patent Gärtner's duct that was the source of the discharge. Several other careful and prolonged efforts were made to probe the duct in order to confirm the diagnosis, but without success.

Though much gratified with having discovered with reasonable certainty the nature of the trouble, I was perplexed about the treatment, but finally determined to close the entrance of the duct into the urethra. This was accomplished by passing a ligature round that portion of the vaginal wall (close to the urethra) which was presumed to contain the duct. The ligature was tied quite tight, and, to my great satisfaction, the discharge was promptly and completely stopped. The following day the ridge in the vagina was enlarged considerably, most at the upper portion. This confirmed the diagnosis of a patent Gärtner's duct. I then divided the ridge or fold of the vagina just above the ligature, and about a drachm or two of clear fluid escaped. I then cut away the whole of the ridge of the vagina. In the portion thus removed I found the duct, which was very small at the lower part, but large enough at the upper part to admit a pocket-case probe.

There was some bleeding, which was arrested with a tampon. The vaginal wound healed readily, leaving the end of the duct open through which the probe could be passed up to the parovarium. A clear discharge, in diminished quantity, continued. Tincture of iodine with five per cent of carbolic acid was injected into the duct. After this there was pain and some rise of temperature, which subsided in about thirty-six hours. Several days after this there was a slightly colored discharge, very small in quantity, which subsided completely, and there was an end to the trouble. Apparently the portion of the duct left became obliterated. All examinations were made and the treatment employed without anæsthesia, which shows that my patient possessed remarkable self-control and was quite heroic.

This is the first case of patency of Gärtner's duct opening into the urethra that I have ever seen; neither have I found any such case recorded in the literature on the subject. It must be of special interest to the profession on account of its being unique, the difficulties of diagnosis, and the special treatment required, which proved successful. The subject is of personal interest because it confirms the opinion that I have always held, that Gärtner's ducts are quite distinct from the ducts of the urethral glands, which I described years ago.

This whole subject has been treated in an original and masterly way by Amand Routh, M. D., B. S., M. R. C. P., in vol. xxxvi of the "Transactions of the Obstetrical Society of London." In this valuable contribution, entitled "On Cases of Associated Parovarian and Vaginal Cysts formed from a Distended Gärtner's Duct," he gives the history of cases occurring in his own practice and that of others. He also relates two cases in which the persistent Gärtner's duct opened into the vagina. One is by Mr. Milton, of Cairo, Egypt, and the other by Lawson Tait. The following gives Dr. Routh's views on this question:

"Details of three cases of the above are given, and also of two analogous cases of patency of the whole length of the duct, with an anterior opening allowing free discharge, and thus preventing distention of the duct along its course.

"Comparison is drawn between such cases and those of distended but imperforate Müller's ducts.

"Evidence adduced from these cases is thought to establish, or at least to render plausible, the following propositions:

"1. That Gärtner's duct can be traced in some cases in the adult female from the parovarium to the vestibulum vulvæ, ending just beneath and slightly to one side of the urethral orifice.

"2. Homology tends to show that Max Schüller's glands are diverticula of Gärtner's ducts, just as the vesiculæ seminales are diverticula of the vasa deferentia. Some evidence is given that Skene's ducts are not necessarily identical with the anterior termination of Gärtner's ducts (as most of those who have traced Gärtner's duct to the vestibule have thought), but that Skene's ducts lead directly and solely from Max Schüller's urethral glands, Gärtner's ducts being continued to the vestibule, behind but parallel to Skene's ducts.

"3. That Gärtner's duct, if patent, may become distended at any part of its course, constituting a variety of parovarian cyst if the distention be in the broad-ligament portion, and a vaginal cyst if the distention be in the vaginal portion. The cases described are instances of the association of both of these cysts, owing to simultaneous patency and distention of both portions of the duct.

"4. Attention is drawn to these cases as affording explanations of some obscure cases of profuse watery discharge from the vagina, not coming from the uterus or bladder.

"5. The question of treatment is also approached, and the opinion is expressed that where the whole duct is distended the vaginal part of the cyst may be laid open as far as the base of the broad ligament, and the broad-ligament portion encouraged to contract and close up.

"A very valuable work on 'The Duct of Gärtner,' by Bland Sutton, was published in 1886, giving his results of examinations of seventy cows; and Mr. Alban Doran, in his review of this work, points out that as Gärtner's ducts are generally admitted to be the homologues of the vasa deferentia, and as the vesiculæ seminales are diverticula of the vasa, close to their termination on the floor of the prostatic urethra, it follows that the Max Schüller's glands of the female urethra are the homologues of the vesiculæ seminales, and he believes with Bland Sutton in thinking that in woman, as in *Bos*, Skene's tubes represent the anterior termination of Gärtner's ducts. This latter conclusion is not, I think, correct.

"When this view was expressed in 1886, no cases had been published of a persistent Gärtner's duct opening at the base of the vestibule; but the cases now given, and other cases of cysts formed out of the vaginal portion of Gärtner's ducts, show that the opening of Skene's ducts and the opening of Gärtner's ducts are not necessarily identical in situation."

I am glad to add this case in further evidence of the ground taken in my first studies in this department.

DISEASES OF THE URETHRA AND URETHRAL GLANDS.

The diseases which affect the urethra and its glands may be divided into two classes:

I. Functional diseases.
II. Organic diseases.

I. FUNCTIONAL DISEASES OF THE URETHRA.

I know of but one form of affection which properly comes under this head, and that is commonly denominated neuralgia. A case will be occasionally met in which there are pain and tenderness of the urethra, with frequent desire to urinate, and pain in doing so. In short, there is a history of subacute urethritis; but, upon the most careful examination that can be made, with all the means at one's command, there will be failure to find any lesions to account for the symptoms present. To this condition the name neuralgia has been applied, rather improperly, no doubt. From my own observation of this affection, in which there are well-marked symptoms, with no apparent anatomical lesions, I have been led to the conclusion that it is a disease of the nerves of the part—one of the neuroses, as they are called. It is quite possible, however, that progress in the diagnosis of urethral diseases may yet enable diagnosticians to find lesions other than of the nerves to account for the symptoms presented by the disease in question. But for the present it must be classed among the neuroses.

So far as I know, it is an affection peculiar to young women. I have only seen it among young married women of marked nervous temperament, and who have not borne children. In some of the cases observed, it was associated with an irritable condition of the introitus vulvæ.

The symptoms are such as occur in a great variety of pathological conditions, and are, therefore, of little value in guiding to a correct idea of the real trouble; and, as there are no diagnostic physical signs present, the diagnosis must be made by exclusion. The most thorough examination of the urine should be made, and the urethra and neighboring organs should be carefully investigated. Perhaps the greatest liability to error lies in mistaking this condition for reflex irritation of the urethra and bladder, arising from ovarian, uterine, or rectal disease. Careful inquiry into the condition of those organs should therefore be made before concluding that the disease is of the urethra itself.

The affection is fortunately rare as well as obscure. I will, therefore, relate the history of some cases, which will give the facts as they were observed clinically.

ILLUSTRATIVE CASES.

One case was that of a lady of a highly nervous temperament, whose parents died of tuberculosis. She was twenty-six years of age, and had been married three years. From the time of her marriage she began to suffer from painful menstruation and uterine leucorrhœa. She attributed her trouble to getting cold while driving in an open carriage behind a fast horse. She had an anteflexion of the uterus and cervical endometritis. The right ovary was large, tender, and prolapsed. Before, during, and after her menses she had smarting and burning pain in the urethra, with a feeling of spasmodic contraction, which sometimes rendered urination difficult and painful. In the interval between the menstrual periods she had tenderness of the urethra and discomfort in passing urine.

The urethra was repeatedly examined throughout its whole extent with the endoscope, but no disease could be found, only tenderness and spasmodic action.

She derived relief from suppositories of morphine and belladonna, but, when last seen, she still had attacks of the same trouble. It was supposed, at first, that the urethral trouble was due to the disease of the uterus, but the former persisted after the latter was relieved.

Another case was that of a lady, aged twenty-nine, who had been married for seven years, but had never been pregnant. She was of a highly nervous temperament, but her general health had always been good. She began to menstruate at fourteen years of age, and continued to do so regularly, but scantily. For several years she had suffered from backache and slight uterine leucorrhœa, and coitus had always been painful. She had frequent and painful urination. The uterus was small—in fact, all the reproductive organs were undersized. There was marked tenderness of the introitus vulvæ. The remains of the hymen were very tender, and at the meatus urinarius and on the vestibule there were a number of quite small papillomata (of the same color as the mucous membrane) that were also exceedingly tender. These were destroyed by an application of equal parts of carbolic acid and tincture of iodine, and the leucorrhœa was arrested by the usual treatment. This relieved her of all the symptoms except those of the urinary organs. Her urine was examined repeatedly, and was found to be normal. The urethra was also investigated, but nothing wrong was found there except that the papillæ appeared to be unusually prominent. I learned that if she retained the urine for an hour or two the desire to urinate passed off, and did not return until the bladder was fully distended. When she did urinate, the desire to empty the bladder continued—i. e., she had vesical tenesmus—but, if she indulged this feeling by passing the urine repeatedly, this tenesmus continued; while, if she resisted the desire, it gradually subsided. This proved conclusively that the cause of the frequent urination was the condition of the urethra.

Quite a variety of agents, which I need not give in detail here, were tried in this case. Suffice it to say that she only derived benefit from coating the entire mucous membrane of the urethra with dry subnitrate of bismuth once a day for a week, and then applying equal parts of tincture of aconite and aqueous extract of opium twice a week for a time. The bismuth was made into an emulsion with water and a little acacia, and applied with the pipette. A steel sound was also passed once a week, and allowed to remain in place for about five minutes. This gave pain at the time, but relief followed. During the local treatment she took nourishing food, iron, and arsenic. She may be said to have recovered; but overtaxation, mental or physical, would bring back the trouble in a slight degree for a short time.

II. ORGANIC DISEASES OF THE URETHRA.

This class may be subdivided into ten groups.

1. Inflammation or urethritis.
2. Granular erosion.
3. Vesico-urethral fissure.
4. Neoplasms.
5. Dilatation.

6. Dislocation.
7. Prolapsus.
8. Stricture.
9. Foreign bodies.
10. Fistula.

1. **Inflammation of the Urethra, or Urethritis.**—This is of three varieties (*a*) acute, (*b*) chronic, and (*c*) gonorrhœal.

Acute urethritis, though not a very frequent disease among women, is a very distressing one, and often difficult to relieve. In many cases it will be found to depend upon a specific cause, that is, gonorrhœa; and I would treat this subject as gonorrhœa in women, were it not that it is often difficult to tell a specific or venereal urethritis from simple inflammation of that portion of mucous membrane. There is a difference in the history when correct testimony is obtained from the patient. Simple urethritis usually comes on gradually, and is often preceded by symptoms of uterine or vesical disease; while the gonorrhœal variety comes on rather abruptly, and is preceded or attended by acute vaginitis and vulvitis. The chief symptom in both varieties is painful urination. Sharp scalding is produced by the urine passing over the tender surface. There is often a frequent desire to urinate, but not so urgent as in cystitis. In some cases the urine is retained for a long time, evidently from a dread of the pain caused in passing it.

In quite a number of cases I have noticed hæmorrhage. That the blood comes from the urethra is known by the fact that it is not intimately mixed with the urine; and after micturition it will ooze from the meatus urinarius.

An examination of the parts will show signs of inflammation about the meatus, with or without the same condition of the vulva. Occasionally, there is a discharge seen coming from the urethra, but if the parts have been recently bathed this may not be apparent. Introducing the finger into the vagina, and pressing upon the urethra from above downward, the discharge can be started, unless the patient has passed water immediately before. The appearance of the discharge corresponds to that of gonorrhœa in its various stages. An examination of the discharge with the microscope may reveal the presence of the gonococcus, and, if so, that will determine the nature of the urethritis. The absence of that germ is not positive proof that the inflammation is not gonorrhœal, unless frequent and skilled examinations fail to find it.

Cystitis, which is liable to be confounded with urethritis, may be excluded by using the catheter, and after letting urine flow for a time, collecting the remainder for examination. The mucous membrane, as seen through the endoscope, is of a deep red, with pus or mucus lodged in its folds. The instrument can not be used in all cases, owing to the acute tenderness of the parts. Bleeding is very likely to occur at the examination, simply from the contact of the endoscope.

The treatment of acute urethritis, whether specific or not, may be conducted on the same principles as that of gonorrhœa in the male, using the same constitutional remedies, local baths, etc. This will suffice in most cases of acute disease; but when it assumes the subacute form from the beginning, then the use of injections becomes necessary.

Dr. Avery Segur, of Brooklyn, finds that the discharge of gonorrhœa is markedly lessened, and sometimes cured, by ten-grain doses of salicylic acid, given in solution several times a day.

I have seen much benefit derived from douching the urethra with water as hot as the patient could bear it. For this purpose I use a catheter made like the fluted roller of a crimping-machine, the appearance of which is doubtless familiar, Fig. 271. Inside the catheter there is a small supply-tube, which conveys the water to the rounded point of the instrument. Behind the point of the catheter, where the grooves terminate, there is a perforation in each groove through which the water returns. By this arrangement the water as it flows back through the grooves is brought in contact with every portion of the mucous membrane. The instrument is passed up to the neck of the bladder, and a fountain-syringe attached to it, and the water as it flows away is caught in a cup.

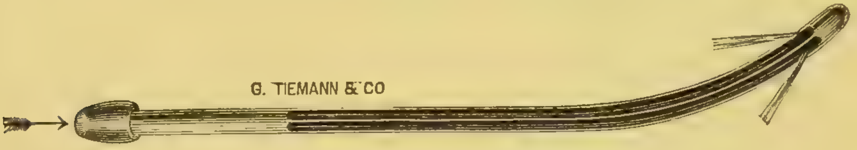

FIG. 271.—Skene's reflux catheter.

The injection of solutions of nitrate of silver, sulphate of zinc, and the like, will often prove useful. It must be borne in mind that the female urethra will not hold more than ten or fifteen drops, and if more is used it will enter the bladder, even where but very slight force is employed while injecting. I use a large pipette, placing the nozzle over (not in) the meatus, and inject slowly and without force a small quantity. When the case is of long standing, and the neck of the bladder appears to be involved also, I use a mild injection of one or two grains of nitrate of silver to the ounce, and inject it through the urethra with force enough to enter the bladder, and let it remain there, to be passed off when the patient urinates. In acute urethritis the most efficient treatment that I have found is to wash out the urethra with the reflux catheter two or three times a day, and then introduce a suppository of iodoform in cocoa-butter, or bismuth and cocoa-butter. In old cases, which began by a severe acute attack, and where the walls of the urethra are very much thickened and the canal contracted, dilatation with bougies does much good. While the bougie is passed once or twice a week, I apply to the vaginal portion of the urethra oleate of mercury or the unguentum hydrargyri. This will often suffice to stop the gleety discharge, as well as remove the thickening of the urethral walls. The case reported by Dr. Howard, which will be found at the close of the consideration of the diseases affecting the urethral glands, would seem to indicate that a gonorrhœal urethritis in which these glands are involved may continue indefinitely unless appropriate treatment is directed to them.

Treatment of Chronic Urethritis and Spasm of the Bladder.—During the past ten years Weiser has adopted a new method of treatment in chronic gonorrhœa, and out of twenty-five cases he has succeeded in curing all but one. The latter was afterward advised to consult Dr. Greenfeld, who, by means of the endoscope, discovered granulations in the urethra, which being cauterized, the man got well after several weeks' treatment. Weiser first passes an elastic or metallic catheter into the bladder, and, after thoroughly evacuating the viscus, injects into it by means of a clysopompe, or, preferably, an irrigator, a solution of sulphate of zinc, 2 to 3, and tannin, 0·5 in 500 of water, at a temperature of 26° R. The catheter is then withdrawn, and the patient directed to empty his bladder, thus bringing the medicated solution in thorough contact with the whole of the urethra. This method is effectual in all cases when no granulations exist. The latter require the application of caustics.

The author has, however, omitted to state how long the treatment must be continued. In cases with associated cystitis three to four drops of nitrite of amyl should be added to the above solution, the former being a very active disinfectant—one or two drops added to a bottle of urine serving to prevent the development of ammonia in the latter for a couple of years. When strictures are present they should be treated with metallic sounds. For the relief of cysto-spasms, the above-mentioned solution may also be employed; one or two injections a day, continued for an average period of three months, usually suffice to entirely cure this condition. Frictions with cold water and lukewarm (26° R.) sitz-baths may be employed as adjuvants.—“*Mittheilungen des Wiener Med., Doctoren-Collegiums, June 23, 1881; New York Medical Record, October 1, 1881, p. 375.*

A Case of Chronic Urethritis treated by Emmet's Button-Hole Operation. (By Virgil O. Hardon, M. D., Atlanta, Ga.)—E. J., white, widow, aged sixty-one, was married at thirteen, and has borne nineteen children. All her labors were normal, as far as she knows, and her health had always been good until twelve years ago. She then began to suffer from frequent desire for micturition, and the act was always accompanied by burning pains. These symptoms gradually increased in severity, until at the present time she is obliged to urinate at intervals of from fifteen to thirty minutes throughout the day and night. The passage of urine produces an intense pain in the urethra, especially at the meatus, radiating upward into the abdomen and downward into the thighs. This pain persists for some time after micturition, so that she is hardly ever free from it. In other respects her health is good, but her naturally robust constitution is breaking down under the constant pain and annoyance to which she is subjected. She is entirely unfitted for social or domestic duties, and nearly her whole time and attention are given to keeping her bladder empty.

Examination shows the meatus contracted so as to scarcely admit a No. 6 sound, and surrounded by cicatricial tissue, forming bands by which it is much distorted. Extreme tenderness exists along the urethra and in the neck of the bladder. The passage of a sound gives exquisite pain. The urethro-vaginal septum is of abnormal thickness and density. Otherwise the pelvic organs are found to be normal.

The urine, of which about an ounce is passed at a time, is straw-colored and slightly turbid. Upon standing there is formed a deposit of about one fourth its bulk; specific gravity, 1028. Chemical and microscopical examination shows it to be free from albumen, sugar, pus, and mucus. The deposit is made up of amorphous urates.

The patient has been treated by internal medication by competent practitioners, but without receiving any apparent benefit.

January 23, 1886, with the assistance of Drs. Bizzell and Wile, she was etherized, and Emmet's button-hole operation was performed. An incision was made through the urethro-vaginal septum, commencing a quarter of an inch behind the meatus and extending to a quarter of an inch from the neck of the bladder.

Through this opening the cut edge of the urethral mucous membrane was drawn, and stitched on all sides to the cut edge of the vaginal mucous membrane with carbolized silk sutures. Thus no surface was left uncovered to heal by granulation. The urethral mucous membrane was found to be so intensely congested as to present a deep purple color, and capillary oozing of blood from it was very free. The parts were smeared with vaseline, and the patient was afterward instructed to make the same application before each micturition. The wound healed satisfactorily, and the sutures were removed on the eighth day, leaving a permanent urethro-vaginal fistula.

In the twenty-four hours following the operation the patient urinated five times, with only slight pain. After the second day she was entirely free from pain, and has continued so ever since. She urinates sometimes twice, usually only once, and occasionally not at all during the night, and from four to six times during the day. She frequently holds her urine for six hours without any discomfort. The urine passes entirely through the artificial opening. The pain at the meatus and the tenderness along the urethra have ceased, and the congestion of the urethral mucous membrane is now very slight.—*Atlanta Medical and Surgical Journal.*

2. **Granular Erosion.**—This very troublesome affection of the urethra may result from urethritis, or may appear without any previous disease. The mucous membrane is covered with young, imperfectly developed epithelium ; the papillæ are hypertrophied and extremely sensitive. This gives rise to the most excruciating pain during micturition, and generally keeps up a distressing tenesmus. This disease is, fortunately, not very common. Old people are most liable to suffer from it. The diagnosis is made from the history and appearance of the urethra. The treatment which is most reliable is cauterization of the whole surface. The milder washes and injections do not accomplish much. Pure carbolic acid may be tried first, brushing it over the surface, and repeating it in eight or ten days. This is the least painful application, and answers in some cases. When it fails, a solution of nitrate of silver (one drachm to the ounce) should be used. In some cases it is desirable before using strong caustics to dilate the urethra, and then touch it with carbolic acid in a mild solution, say two per cent.

Among the inflammatory affections of the female urethra are mild forms of congestion and irritation, that fall short of well-marked urethritis. Indeed, some of these attacks amount to little more than congestion or slight catarrh. In others, I have found circumscribed patches of the urethra inflamed, and the rest of the canal normal.

There is little, if anything, in medical works on the subject of these mild yet troublesome affections, and I hope that a clear idea of the subject will be gained from the narration of some cases which have come under my observation.

ILLUSTRATIVE CASES.

A young, married lady had been under my care for dysmenorrhœa caused by anteflexion. She had recovered sufficiently to believe that she was well enough to go to a party and dance to excess, which she did, and caught cold on the way home. On the second day after I was called to see her, and found her with the usual symptoms of an ordinary cold, that caused her little anxiety. But she was suffering severely from frequent and painful micturition. I found slight general congestion of the uterus and vagina, and suspected cystitis, but the urine was normal. I then examined the urethra, and found it congested throughout, and with streaks of mucus lodged in the folds of the membrane. There was neither erosion nor ulceration.

I directed her to rest quietly in bed, and drink freely of flaxseed-tea and spiritus ætheris nitrosi. A suppository containing one quarter of a grain of extract of belladonna and a sixth of a grain of sulphate of morphia was directed to be introduced into the vagina at bed-time. Under this simple treatment she rapidly improved. Twelve days after the date of my visit she called to see me, and I then found that she could retain her urine for hours, but still had slight pain and burning during micturition. The urethra was again examined with the endoscope, and a few red patches found scattered here and there along the canal. This was all that remained of the trouble. Liquor bismuthi, sufficient in amount to fill the urethra, was injected every second day for a week, when she declared herself quite well.

A second case was that of a young lady, healthy and active, who was head saleswoman in a department of a large dry-goods establishment. During the holidays, from Christmas to New Year's, she was on her feet from eight in the morning until ten or eleven at night. On the last day of the year she was seized with pain and burning in the urethra, and soon after she began to suffer from frequent and painful micturition.

Three or four days after the attack I examined the urethra, and found several small ecchymoses at various parts of the mucous membrane, the highest one being near the neck of the bladder. These spots were due to hæmorrhages that had taken place into the mucous membrane, beneath the epithelial layer. The spots were dark, almost black in the center, and surrounded by an inflamed border, which was bright red at the inner margin, but gradually shaded off into the natural color of the surrounding mucous membrane.

My idea of the pathology of this case is that the congestion arising from the maintenance of the erect position for so long a time caused some of the small vessels to rupture, and the hæmorrhage into the membrane produced little circumscribed spots of inflammation.

She was directed to rest in the recumbent position, and drink freely of Vichy water. This she did, and made a good recovery; but it was six or eight days before the pain in urinating left her entirely.

It will be observed that these cases were both acute, and recovered very promptly; and I could give several more histories which might lead to the supposition that such trivial ailments of the urethra are not of much importance after all. It might also be presumed that this form of urethral disease would disappear in most cases without being treated. This is no doubt true, but they do not all recover spontaneously. Some of these mild cases tend to continue. They become chronic, and if neglected will continue for years, to the great annoyance of the subject. Of the chronic or continuous form of urethritis the following are good examples: A single woman, thirty years of age, had for ten years been occupied as dressmaker, and was in the habit of operating a sewing-machine occasionally. Her general health had always been excellent, but she consulted me for what she supposed to be an affection of the kidneys. She said that for five years she had been annoyed with painful and frequent micturition. She was obliged to urinate every two or three hours during the day, and several times in the night. Standing, walking, or exposure to cold invariably made her worse.

An examination of her pelvic organs revealed slight catarrh of the cervix uteri, and a mild vaginitis, limited to the upper and posterior portion of the vagina, most marked behind the cervix. Her urine was examined carefully and found to be normal. The urethra was then examined by the endoscope, which brought to view a highly inflamed spot on the anterior wall of the urethra, and an inflamed ulcer on the posterior wall. The disease was limited to the middle third of the urethra, and, while extending all around, was most marked anteriorly and posteriorly. The ulcer, which lay in the posterior wall or floor of the urethra, was superficial and appeared through the endoscope as a gray spot surrounded by a bright red areola. It bled on contact with or stretching by the instrument. The color of the upper and lower third of the urethra was somewhat darker than usual, but otherwise normal.

The recovery in this case was somewhat tedious, because it was one of my first cases, and my treatment was experimental and not always beneficial. First, I touched the inflamed parts with a solution of nitrate of silver (one drachm to the ounce), using just enough to whiten the surface. This gave her rather sharp pain, which passed off, however, in a few hours. After this she had much pain in passing water, but the frequency was about the same as before the application. About ten days after using the solution the parts, though still inflamed, were much improved.

This advantage gained suggested a repetition of the application, which I made. It was followed by very severe pain, that lasted two days and nights before it subsided. There was no improvement. After this I injected into the urethra, twice a week, a solution consisting of

℞ Zinci sulphatis.......................... gr. iv.
Fl. ext. hydrastis Canadensis.............. ʒ j.
Aquæ.. ℥ iij. M.

About half a drachm of this was used at a time. This was continued for about a month with marked benefit. At the end of that time she could rest all night without urinating, and had to micturate only about every four hours during the day, and had very little pain. Injection of liquor bismuthi (half a drachm) was then begun, and continued twice a week for three weeks, when she was free from all trouble, but was obliged to urinate every four or six hours, from habit, I suppose.

One other case may be given to show the disposition of this form of urethral trouble to continue. This patient was thirty-nine years of age, and had been a widow for sixteen years. Her only child was a grown-up woman. Four years before I saw her she had a catarrh of the bladder, for which she was treated by a skilled physician. She recovered from that after a time, the urine becoming normal, and the ability to retain it excellent. She continued, however, to have pain in passing urine, but as there was no discomfort at any other time she was satisfied to tolerate that.

Being troubled with constipation while traveling, she was taken with agonizing pain after defecation, continuing to suffer with it for several months. She then applied to me for relief. She stated that the pain during micturition had been much worse since the development of the rectal pain. The rectum was examined with the endoscope (the same instrument used in exploring the bladder and urethra, but of larger size), and a well-defined fissure detected. This explained the rectal symptoms, and it is fair to suppose that the urethral trouble was aggravated by it sympathetically. The lower third of the urethra was found to be inflamed, and in places eroded. The anal fissure was relieved by the usual operation, and the urethra was treated with applications of nitrate of silver (one grain to the ounce). Recovery was speedy and satisfactory.

3. **Vesico-Urethral Fissure.**—This affection holds an intermediate position between cystitis and urethritis, and in its symptomatology bears a marked resemblance to both, and I have therefore deferred its consideration until both these diseases have been treated. I am fully satisfied that it is often mistaken for inflammation of the bladder or urethra.

It is only within the last few years that this trouble has been brought to the notice of the profession, and hence there is very little in medical literature on the subject. This affection has heretofore been called fissure of the neck of the bladder. Were I to name it according to its location, I should say vesico-urethral fissure, for its usual site is at the point of junction of the two.

The lesion, as the name indicates, is a crack or fissure of the mucous membrane, produced by ulceration. It runs lengthwise of the urethra, and is situated in one of the sulci or folds of the membrane formed by the corrugations which always exist when the urethra is not distended. It is usually spoken of as situated in the vesical neck, but as a rule two thirds of it is situated in the urethra, the upper end of it only extending into the bladder.

It may occur at any part of the circumference of the urethra. In the majority of the cases that I have examined it has been situated on the right side anteriorly. Those who are familiar with fissure of the rectum will understand that fissure of the vesical neck is exactly the same in appearance, save that it is much smaller. It is from a quarter to three eighths of an inch in length, and from one twelfth to one sixth of an inch in width at the center, but tapering off at each end.

The deepest part has a yellowish gray color, like that of an indolent ulcer, while the edges are red and actually inflamed, like those of an irritable ulcer. When seen through a large endoscope that puts the parts upon the stretch, it may appear freshly torn and bleeding. The edges are usually abrupt, elevated, and indurated, and of a dark or bright red color. This shades off gradually into the normal membrane of the urethra.

The importance of this lesion depends upon its site. An ulcer or fissure of the same size, if situated in any other portion of the urethra, would cause little suffering beyond a smarting sensation during micturition. But occurring at the union of the bladder and urethra it is submitted to constant though slight pressure, which causes severe and continuous pain. I believe that the very great suffering caused by this disease is due largely to the fact that these parts of the bladder and urethra are by far the most sensitive, and that the upper portion of the fissure, which extends into the bladder, is exposed to the irritation of the urine, which excites the constant desire to urinate. The pain which is thus produced causes excessive contraction of the urethra and bladder, and this contraction again causes pain, "the vicious circle," as it is termed, being thus established. In other words, the cause produces an effect, which in turn, acts as a cause and aggravates the original disorder.

Symptomatology.—The symptoms of fissure are a constant desire to urinate, and a feeling of burning pain at the neck of the bladder. There is acute pain both during and immediately after the act of micturition, and severe tenesmus, which causes the patient to make voluntary straining efforts at evacuation after the bladder is empty. Immediately after urination the pain and burning are often intense. After a time it partially subsides, but again commences when a little urine collects in the bladder.

When the patients resist the desire to urinate (as they often do at night when unwilling to get up) the distress is much aggravated. It will be seen that all the symptoms mentioned are much the same as those presented in cystitis, and on that account are not reliable guides in diagnosis. Urethritis also gives rise to many of the symptoms named above, and might be mistaken for urethro-vesical fissure. There are, however, some points of difference between the symptoms of these three affections that are deserving of notice. In fissure the pain is, as a rule, more circumscribed than in either cystitis or urethritis, and in many cases more acute. Urination in fissure is always followed by the maximum of pain, while in cystitis there is a slight sense of relief. In urethritis the greatest pain is experienced during the act of urination; it then subsides gradually, and is usually absent before the next evacuation of the bladder.

Diagnosis.—The question of diagnosis will usually rest between fissure, urethritis, and cystitis. The latter can be easily and positively excluded by an examination of the urine. Passing a catheter into the bladder and allowing a little urine to flow through it will wash away any pus or mucus that may have been caught up in its introduction. The remaining urine should be saved for examination, when if fissure alone exist, it will be found free from all the products of cystitis.

The exclusion of urethritis and the detection of fissure are accomplished by the endoscope, and by the use of this instrument a correct diagnosis can easily be made. I have already described the method of using my endoscope, but there are a few points in the examination for fissure to which I have yet to call attention. In the first place, the neck of the bladder must be found exactly, and to accomplish this the instrument must be used when there is at least a small quantity of urine in the organ. Then the tube is to be introduced far enough to be sure that it enters the bladder. Next the mirror is to be passed in, and, when it enters that part of the tube surrounded by urine, it will be seen that it becomes black, i. e., the wall of the urethra (which was reflected as the mirror was passed in) disappears, and nothing can be seen. By slowly withdrawing the mirror the upper end of the urethra will come into view, and by moving it backward and forward and turning it round, the whole circumference of the vesico-urethral juncture can be clearly seen, and the fissure distinctly observed.

The service rendered me by this instrument in studying this affection has been very great. Indeed, I was never able to detect a vesico-urethral fissure until I used this endoscope to look for it. I have tried repeatedly to find a fissure with the ordinary open-tube endoscope, and have invariably failed, and for these reasons: Fissure lies in a longitudinal sulcus of the mucous membrane, and is hidden from view at the upper or open end of the tube. It can only be brought to light by distending the urethra at the point to be observed, and that can not be done with the instrument in question. Again, when the open tube is carried up to the neck of the bladder, where the fissure is situated, the urine flows into the tube and puts a stop to observations.

The description of the appearance of fissure already given was taken from my own observation with the endoscope, and, therefore, need not be repeated here.

Causation.—The cause or causes of fissure here are not well understood. At least, I have not been able to find anything in the books that is clear and definite on the subject.

From a careful study of the cases which have come under my own observation, I am satisfied that fissure (or irritable ulcer) is developed from urethritis. I will suppose that a woman gets urethritis, from any cause, and that it extends to the neck of the bladder, and dips down into the folds of the mucous membrane. It is easy to understand that the pressing together of the two inflamed surfaces of the membrane in these folds will increase the irritation and keep up the disease. Urine, mucus, pus, and exfoliated epithelium are liable to lodge in this location, and add very much to the irritation. All this leads to ulceration, and when this is established it remains, with no tendency to recover. Even if the parts were inclined to heal, the irritation of the urine and inflammatory products, as well as the contraction of the inflamed surfaces upon each other, would prevent, or at least hinder, recovery.

It can be seen that an urethritis might end promptly in recovery (either by the natural tendency of mucous inflammation to return to health, or under the influence of treatment), except at the point of fissure, where the conditions named tend to produce ulceration, and when once developed, to keep it up.

Injuries during confinement, displacements of the bladder, indeed, injuries of any kind that are sufficient to cause inflammation at the vesico-urethral juncture, doubtless tend to the establishment of fissure.

Bungling or careless use of the catheter, or injections into the bladder or urethra, might have the same evil effects.

I suspect, but am not quite sure, that very small calculi passing along the urethra may be a cause of this trouble. This supposition is based on a case which occurred in my practice. Its history is this. The lady had a vesico-vaginal fistula, and after it was closed she had catarrh of the bladder. During the course of that disease she was taken with hæmorrhage, which lasted some days. She then had violent pain in urinating, and passed several lumps which were composed of mucus and some of the salts of the urine. These pieces were rough, gritty masses, which no doubt scratched the urethra as they passed out. Soon after this she was found to have a fissure that tormented her to an extent beyond description. Dilatation of the urethra and topical applications relieved her.

Treatment.—The subject of the management of vesico-urethral fissure is one of interest and importance, as much so as anything in surgery. On the one hand there is the terrible suffering of the patient, and on the other there are many difficulties to be encountered in the efforts to relieve her. The demand for treatment is urgent, and skill in the highest degree is necessary to accomplish a cure.

I must first say what ought not to be done in these cases, and thereby guard against making them worse instead of better, as it has been my misfortune to do on more than one occasion. As a rule, all injections and instillations such as I have recommended in cystitis, and shall advise in urethritis, do harm in fissure. I have used injections of mild solutions of nitrate of silver, and the application of stronger solutions to the diseased part, with the invariable result of increasing the spasmodic contraction of the bladder and aggravating the suffering of my patients.

While such applications are useful in inflammation of the bladder and urethra they do harm in fissure. This I have repeatedly proved to my own satisfaction, and the facts accord with our experience in other departments of practice. Nitrate of silver and nitric acid have been applied to ulcerations of the rectum with marked benefit, and without being followed by pain of any account; but the same application made to fissure within the grasp of the sphincter ani does little if any good, and usually increases the suffering of the patient. The same is true of the fissure under discussion. When a diagnosis of vesico-urethral fissure has been made, the usual local treatment is not to be employed, at least active measures in the way of powerful applications are to be avoided.

Soothing applications, alterative in their action, are worthy of trial. Exposing the fissure with the fenestrated speculum, and dusting it over with calomel or finely pulverized iodoform, sometimes give relief. Subnitrate of bismuth may be used in the same way in the hope of doing good. There is one great point to be remembered in using these remedies, and that is, that if they fail to accomplish the desired end, they do no harm.

I have used with benefit the "mitigated" stick of nitrate of silver. It consists of one part of nitrate of silver to two or three parts of the nitrate of potash. Drawing a fine point of this through the fissure causes sharp pain at the time, which is often followed by burning, and tenesmus, which, however, soon subside. In some cases the trouble is relieved by this treatment.

Incising the fissure, in the manner that surgeons treat the same disease of the anus, has been followed by great relief, but I do not believe that I ever cured a case in this way. For this operation I use a small knife, which is represented in Fig. 272.

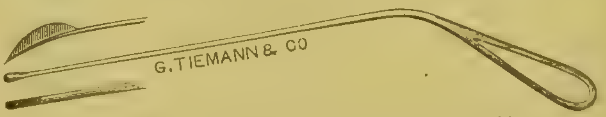

Fig. 272.—Skene's fissure probe and knife.

In the employment of this local treatment great difficulty will be found in getting at the diseased spot. The fissure can easily be seen through the glass tube of the endoscope, but to expose it and make applications to it are exceedingly difficult tasks. I have tried in a variety of ways to do this, but have found that the only satisfactory way is by means of the endoscope, consisting of a glass tube, hard-rubber external tube, and mirror, which I have fully described. This combination of speculum and mirror answers very well in applying such remedies as bismuth, calomel, and the like; but it will be found that skill and patience are required to touch the fissure with the nitrate-of-silver stick, or to incise the part as already advised.

The method which I employ is this: A small silver probe is bent into the shape shown in the figure (Fig. 272), and its point is coated with the material to be used. It is then introduced through the speculum and drawn slowly through the fissure so as to produce superficial cauterization of the ulcerated part. The point of the probe is coated by melting the "mitigated" stick of nitrate of silver in a platinum cup, into which the probe is dipped and the coating allowed to cool. The dipping may be repeated as often as is necessary to get the required amount of caustic or coating on the probe.

Before applying the caustic, any mucus or serum that may be in or about the fissure must be sponged away. This may be done by wrapping a piece of absorbent cotton on the end of a probe, and using it as a sponge.

It will be observed that I condemned caustics in the treatment of fissure, and still advise cauterizing the diseased part with nitrate of silver. The point is simply this, that caustics applied by injection to the neck of the bladder in which there is fissure do harm, but caustic applied to the fissure only, does good.

I have observed that pain follows the application of caustics, but if the diseased portion and nothing more is thoroughly touched, relief follows. The old trouble and pain are, however, liable to return in time. The same may be said of incision, viz., that relief is but temporary. I think that the bleeding which is caused relieves irritation and congestion for a time, but I can not say that I have ever seen a permanent cure follow this treatment, except in a few cases, where the treatment was begun early in the course of the disease.

I come now to dilatation of the urethra as a means of relieving fissure. Although I have left this measure until the last, it is really the first in importance in the treatment of this affection. Indeed, I am inclined to think that it is of much more value in the treatment of fissure than in that of either cystitis or urethritis.

I have already sounded a note of warning against the two great dangers of dilating the urethra—viz., rupture and incontinence, and incontinence without rupture. Both accidents are liable to occur in dilating the urethra, but they only occur when the dilatation is carried to a great extent, sufficient at least, to admit the ordinary sized index-finger. This extreme dilatation is not necessary in the treatment of fissure. I generally ascertain what sized sound can be passed with ease, and then dilate sufficiently to admit one three or four sizes larger. This is usually all that is necessary.

Before dilating it must be seen that the urine is normal in character, or as nearly so as can be made by general treatment. Then the urethra is to be dilated, the patient being kept at rest, and the urine made as bland as possible with diluent drinks.

In case that incontinence should follow (though I presume that will not occur), its treatment should at once be commenced by supporting the urethra in the way that I have advised, viz., with the pessary for that purpose. I believe that, if taken in hand within three or four days after it occurs, the incontinence can be relieved.

Should the treatment that I have thus far recommended fail, then a vesico-vaginal fistula should be made, the bladder and urethra washed out regularly, and if need be medicated. The fistula may be allowed to close of its own accord, as it usually will do. By the time the fistula closes, the fissure will have healed. In making a vesico-vaginal fistula to cure fissure, the knife or scissors should be used, and not the cautery; because it is not necessary to maintain the opening in the bladder for a very long time; and if it closes of its own accord, a very important operation is avoided.

4. **Neoplasms of the Urethra.**—A knowledge of urethral neoplasms is by no means confined to recent times, but up to a late date they have not been studied as closely as they deserve to be, nor classified in a comprehensive and scientific manner. The various tumors have frequently been confounded with one another by authors and observers, and much confusion and obscure statement have resulted in regard to their symptomatology, pathology, and treatment.

These growths have been variously known as carunculæ, cellulo-vascular tumors, fleshy and vascular growths, fungoid excrescences, strawberry and raspberry tumors, each name sometimes having been used to cover the whole class.

Winckel's division and classification are most excellent, and to some extent I shall follow them in the consideration of the subject. I will classify these tumors as follows:

Papillary.—Condyloma.
Glandular.—Cysts, myxo-adenoma, mucous polypi.
Vascular.—Angioma, varices, phlebectases.
Areolar Connective Tissue.—Fibroma, sarcoma.
Epithelial.—Epithelioma, carcinoma.
Compound.—Papillary polypoid angioma, erectile tumors.

Neoplasms of the urethra are more common in the female than in the male, and, of course, easier of diagnosis and treatment.

Papillary Neoplasms.—Under the first head, or that of papillary neoplasms, will be seen condyloma, a growth of a low grade, and of a warty appearance. The surface may be bright red, or partially white, from epithelial aggregation. These growths are painless, and do not bleed on touch or manipulation. They may or may not be pedunculated. They may occur singly or in clusters, and be wholly within the urethra or projecting from the meatus.

They consist of somewhat dilated capillaries set in a tough homogeneous network of connective tissue, the whole having a thin epithelial covering, that may at times be increased by an unusually rapid epithelial proliferation. This only occurs when the tumors are much irritated.

Glandular Neoplasms.—Cysts of the female urethra are not common, and are not confined to any period of life, having been found in a fœtus of from six to seven months and in all subsequent periods of life.

They are in early age situated in the anterior or meatal portion of the urethra, but later in life nearer the vesical neck. They may or may not project from the urethra; however, they cause a greater or less obstruction to the free outflow of urine. They are usually formed by the occlusion of the orifice of the small urethral ducts or glands, and, in some cases, a black speck upon the surface of the cyst indicates the seat of the former orifice.

By bagging of the mucous membrane and absorption of the contents, these small cysts may be transformed into polypi.

Winckel says that the internal wall of the cyst usually shows numerous small papillæ, and is lined with pavement epithelial scales.

Myxo-adenoma are quite rare. They are small (the largest being seldom larger than a small hazel-nut), of a bright scarlet color, and quite vascular. They consist of a number of vessels set in partly destroyed gland tissue, and small meshes containing myxomatous matter. The whole is contained in the meshes of a soft, loose connective tissue.

Polypi coming under this head are those formed by occlusion of the orifices of one or more of the ducts or follicles of the urethra. The other forms of polypi will be considered under their proper head.

Vascular Neoplasms.—Angioma, varices, and phlebectases are really different names for about the same condition—viz., an increase in the caliber of the veins and venous radicles, allowing an overdistention, at first intermittent, and later chronic. They appear as bunches or bundles of worm-like, irregularly distended dark blue or bluish red vessels. There is more or less thickening of the mucous membrane and connective tissue about them; they are, in fact, in all respects analogous to rectal hæmorrhoids. They may occupy any part of the urethra, but usually select the floor of the canal. The trouble they cause depends on their size. If large, they obstruct the urethra. Sometimes the vessels rupture, and the blood is poured out beneath the mucous membrane. Tumors resulting from rupture of such varices under a normal mucous membrane have been known to some authors under the name of hæmatoma polyposum urethræ, which describes very well the condition resulting.

Some of these vascular tumors have been found to be erectile, the anatomical peculiarities of which structure are already familiar.

Virchow believes these tumors to be a combination of urethral hæmorrhoids and remnants of embryonal duplicity of the vagina.

Areolar Neoplasms.—These new growths are either fibromata or sarcomata.

The fibromata may lie within the canal of the urethra or be imbedded in its walls. When in the urethra or protruding from the meatus, they are pedunculated, and have been known as urethral polypi. They vary in size from that of a pea to that of a goose-egg. They consist of numerous densely packed fibers, that give the same appearances as fibromata elsewhere.

They have been found in several cases at birth, but are of rare occurrence at any age. When congenital, they have been known as congenital polypoid excrescences. The tumors are usually covered with several layers of pavement epithelium.

Sarcoma of the urethra is an extremely rare affection, but one or two cases being on record. One case observed by Beigel is described by Winckel. It was trilobed, about the size of a walnut, and was situated about the edge of the external meatus. It was in part hard, in part soft, the harder portion consisting of a fine fibrous network, the interstices of which were filled with small cells. In some places the cells were absent and the stroma more dense, and in the peripheral parts the network, while coarser, was firm, and presented cavities filled with a colloid material. The tumor was extirpated, but nothing is said about its return.

Epithelial Neoplasms.—The existence of cancerous disease of the female urethra as a primary affection is greatly doubted by many authors, but it probably does occasionally occur. Indeed, as a secondary disease, it is quite rare, for, when extending from the uterus or neighboring organs to the bladder, death, as a rule, results before the urethra is involved. In cases where life is unusually prolonged, the disease seldom attacks more than the vesical portion of the canal.

Extension from the outer genitals, which are very rarely affected with cancerous disease, is still more uncommon, and possibly has never occurred. One case is recorded, however, in a woman who had long suffered from uterine prolapse, where a tumor, which depended from the frænicululm clitoridis, had invaded the meatus urinarius. Under the microscope it proved to be a flat-celled epithelio-cancroid.

We have the record of cases of periurethral cancer that appeared at the introitus vulvæ near the meatus, and in the connective tissue about the urethra, as small, hard, painless tubercles, the urethra or its membrane not being involved.

Symptomatology.—Pain is the exception rather than the rule in this affection; but in some instances acute, lancinating pains are present. At first the tubercles are small, hard, and usually painless, but after a time they soften, ulcerate, and bleed freely. The vestibule and urethral mucous membrane are usually involved in the mischief.

The affection has been divided into three grades, in the first of which, according to Winckel, "but half the length and depth of the urethra is invaded by the cancerous tubercles; in the second the vesical neck and pelvic fascia; and in the third the pubic symphysis, descending pubic rami, and the closely blended connective tissue are involved."

Compound Neoplasms.—The most common, and consequently the most interesting form of urethral neoplasm, is the papillary polypoid angioma.

These tumors vary in size from a pin-head to a hickory-nut, and may be either multiple or single, but are usually single. They vary in color from a pale to a bright red, and may or may not be pedunculated. Their favorite seat is on the posterior wall of the lower half of the urethra, very near to or at the meatus. This neoplasm is generally known as urethral caruncle, or vascular tumor of the urethra, and is described very fully in most of the books on diseases of women. Indeed, it is the only abnormal growth of the female urethra that I ever read or heard of in my student days. There is really not much difference between this form of neoplasm and the vascular tumor of the urethra already described, and what is far more important both of these neoplasms have been confounded with hyperplasia of the tissues around the mouths of the ducts of the urethral glands. This condition will be discussed under the head of diseases of the urethral glands. There are very good reasons why this affection should have claimed early attention from gynecologists. It occurs frequently, and nearly always causes great suffering, and is easily detected, because it grows at the meatus urinarius, where it can be seen.

It consists of bunches of dilated capillaries set in a moderately dense stroma of connective tissue, and covered with mucous membrane, which has the usual pavement epithelium. One case, however, is recorded where the pavement was replaced by columnar epithelium. The vessels are greatly dilated, and in some cases very tortuous; in others much less so.

In some cases these tumors partake of the erectile character, being markedly increased in size at the menstrual period, and at other times.

Occasionally small tumors of this kind are found singly in the vestibule. As a rule they bleed very easily on touch, and are exquisitely sensitive. Observers differ as to whether the nerve supply to the tumor is marked, some claiming to find a large nerve distribution, others to find none. As they are exceedingly tender, the inference may be drawn that they are well supplied with nerves.

Symptomatology.—Unless the tumors be of large size the patient may go on for a long period without experiencing anything more than a slightly irritable condition of the urethra. When, however, the tumors become large, or are of the polypoid angioma variety, the pain is markedly increased, and the obstruction to the outflow of urine becomes very apparent. These tumors, by constant moisture and friction, become eroded on their surface, and these ulcerations, being constantly aggravated, give rise usually to slight hemorrhage and increased pain. Retention of urine may result from their closing the urethra.

Of all the urethral neoplasms, however, the papillary polypoid angiomata are the most intensely painful, and patients retain their water for a long time to avoid the agony that is produced by passing it. The pain is, in some cases, present at all times, and is greatly aggravated by sitting or lying down. The clothes coming in contact with the exquisitely sensitive surface often produce vaginal and anal spasm. Coition is sometimes impossible. A case is related of an old woman thus affected, who, though married some thirty years, was still a virgin. Indeed, this affection is sometimes mistaken for vaginismus, and treated accordingly. The directions which I shall give under the head of diagnosis will, I think, be sufficiently plain to prevent such mistakes.

Even when these tumors are too small to obstruct the urethra, obstruction may occur from severe spasm due to the pain caused in the act of micturition.

Bleeding from these tumors is not uncommon, but it seldom amounts to much, and is easily controlled.

The pain in any of these new growths is not always confined to the urethra, but may be felt in the back, hips, suprapubic region, thighs, knees, and feet. In carcinoma lancinating pains may be present, but this is by no means the rule.

As the tumors increase in size, the urethra becomes gradually dilated, and the mucous membrane eroded, hyperæmic, and catarrhal. Its structure may become loose, flabby, and vascular, and a pouch form behind the tumor. If far enough back to interfere with perfect closure of the vesical neck, incontinence may occur, and inconvenience and distress the patient greatly.

Sometimes the bleeding is severe, and the patient suffers from anæmia caused thereby. This is more usually the case if, in the destructive process attending carcinoma, an artery of any considerable size is opened into. This accident, however, rarely occurs.

In the extremely painful neoplasms, the face gives evidence of constant pain, distress, and anxiety; and in the most aggravated forms patients are pale, emaciated,.and extremely low-spirited, often wishing earnestly for death to relieve their sufferings.

If the tumor be of sufficient size to be a serious bar to free micturition, cystitis, pyelitis, and more serious results, as renal destruction, are to be feared.

The presence of small, and even large tumors, in the urethra and about the meatus often gives rise to increased sexual desire, that is gratified in the young girl by masturbation.

The urine is normal, save that it contains the products of urethral disease, viz., epithelium, pus, mucus, and sometimes blood. Small pieces of the tumor, small cysts or polypi, the pedicles of which have died or been torn through, are sometimes found in the urine.

In cancerous neoplasms, as the disease invades the tissues to the second and third degrees mentioned in connection with malignant tubercle, the patients gradually sink and die from exhaustion from severe bleedings, loss of rest, and general cachexia. Some cases, however, do not succumb until long after the third degree has been reached, with extensive destruction of tissue.

Diagnosis.—The diagnosis of urethral neoplasm is really quite easy, provided the investigation is thoroughly and intelligently conducted. When a woman comes to the physician complaining of pain on micturition, pain in sitting, obstructions to or interruptions in the flow of urine he should at once proceed to a thorough investigation of the parts, first by the eye and touch, and second by the aid of the speculum, endoscope, and an examination of the urine. If the tumor presents at the meatus, it will, of course, be readily seen, and can be easily diagnosticated.

If in the urethra, the finger passed along the course of the urethra in the vagina, with some dilatation of the meatus, will discover it. If of small size, the endoscope, with a strong light, will give an excellent view of it. If the tumor be exquisitely sensitive, as some are, the patient should be wholly or partially anæsthetized, and then the examination can be fully and freely made. Vaginismus may be excluded by passing the finger into the vagina, away from the urethra, when no spasm will take place; but if the urethra is touched, the spasm is at once produced.

To determine whether the inflammatory mischief, when it exists, resides in the urethra alone, the patient should be directed to pass one half of her urine into one vessel, and the other into another. If the trouble is seated in the urethra only, the last urine passed will be totally or almost wholly free from the inflammatory products. The same may be accomplished also by drawing off the urine with a clean catheter.

In some cases the varicose condition of the vessels of the mucous membrane, with considerable swelling, may simulate prolapse of the mucous membrane. If, however, the blue discoloration is borne in mind together with the elastic feel, and the reduction in size under compression of the urethral hæmorrhoids, there will seldom be any error in the diagnosis. Of course, prolapse of the mucous membrane and a varicose condition of the urethral veins sometimes coexist, and this must not be forgotten.

Tumors, usually those of large size and pedunculated, often cause some degree of prolapse of the mucous membrane by constant dragging. A prolapsus of the mucous membrane may also simulate a tumor. The position of the meatal orifice, and the fact that it can be reduced, will distinguish the prolapse.

To distinguish one kind of tumor from another is not always easy, but with a little care it can be accomplished. The condyloma will be recognized by its painlessness, its warty, cracked, pinkish white or white surface, and the fact that similar growths are at the same time usually found on the vestibule. The polypoid angioma will be known by its bright-red surface, its tendency to bleed easily, and the exquisite pain produced when touched. The sarcoma will be readily confounded with the angioma, but it is very rarely found here; and if there is any doubt, a little piece may be scraped off with the curette, and examined microscopically. Should doubt still remain, the history and progress of the disease will soon determine the nature of the trouble. The malignant tumor will grow much faster than the other. The varices can be told by their bluish color and their shrinking under pressure, and the cysts and fibromata by their smooth, painless surface, normal mucous covering, and their consistence.

Carcinoma appears, as I have already said, as hard tubercles (usually periurethral), which after a time break down. When this occurs, the endoscope, the lancinating pains (if present), the rapid invasion of neighboring tissue. and the composition of the diseased mass, under the microscope, will tell the story.

Prognosis.—The simple forms of urethral tumor are easily removed, and do not return. As a rule, therefore, the prognosis is good. Of this class are cysts, condylomata, mucous polypi, and fibromata.

The angiomas are of a more serious nature, as by the pain and suffering which they cause the constitutional condition is usually low; and, though they may be extirpated, they are likely to return and rapidly increase in size, even in from one to three months' time. Although the bleeding from these tumors is rarely very great, still there may be numerous small hæmorrhages, and at times severe ones, either from the urethra externally or into the bladder. Under proper treatment, however, there is always a possibility, and in some cases, a certainty of cure.

In carcinoma there is no hope of effecting a cure, although the patient's condition may be much improved in some cases. Death usually ensues before the third degree is reached. Almost the same may be said of epithelioma, unless it is treated in its early stages.

Causation.—The causes of the various neoplasms are not yet clearly made out, and will not be, I think, until more extended observations are made on the subject. Even then it is more than probable that some of them will remain obscure.

The predisposing causes are a laxity of the urethral tissues, with a tendency to a varicose condition of the parts, usually found in old age; a general tendency to venous stagnation, catarrh of the mucous membrane, and dislocation of the urethra, partial or complete.

As a proof that no single special cause produces these conditions, it may be said that these growths have been found congenitally, and at every period during life, as late indeed as the ninety-second year.

The exciting causes, as given by different authors, vary. The following are some of those usually mentioned:

1. Temporary or chronic congestion of the urethra during pregnancy, uterine and ovarian tumors, and obstructed portal circulation.

2. Injuries to the parts during labor, external violence, the irritation of chronic and acute urethritis (specific or simple), syphilitic poison, and masturbation.

Of course, the carcinomata, cysts, and simple mucous polypi, are not here included, although some of the above causes might aggravate if not produce them, for I have already spoken of their method of causation as far as it is known. Cancer occurs by extension of the disease from other parts; cysts and mucous polypi, from occluded duct orifices. This narrows the list to the nervous class and the compound, viz., the polypoid angiomas. And of these I may venture to say that any cause, such as constant irritation, sudden injury, or slow congestion, may produce these conditions, especially in those who are somewhat predisposed; but that any one cause, such as the gonorrhœal poison, is sufficient to produce them, in all cases, is more than doubtful.

Most of these tumors occur in married women, both in those who have borne children and in those who have not.

It might be supposed from all that has been said upon this subject that urethral neoplasms are very common. On the contrary, they are very rare, with the exception of polypoid angiomas.

Treatment.—The treatment of these cases is, in most instances, entirely surgical, but when the general system is deranged in any way it should receive careful attention. If there is a congested condition of the urethra, the portal circulation should be kept in a normal state by securing a healthy action of the liver and bowels. The condition of the circulation in the part involved may possibly be influenced by constitutional medication. For this purpose, ergot, digitalis, and nux vomica, in small doses regularly repeated, may be of service. These remedies will at least aid in securing a good general circulation, and may influence favorably the local affection. If there is local congestion due to pressure on the pelvic vessels, the cause, interfering with the return circulation, should be removed, or remedied, if possible.

The local treatment recommended by the various authors differs widely, but has the same end in view, viz., destruction or removal of the abnormal growth. The various methods of extirpation employed are ligation, torsion, excision by the knife, scissors, curette, écraseur, galvano-cautery, caustics, and electrolysis. Any one of these methods may be made to answer in all cases, but a judicious selection, according to the location and nature of the neoplasm, is advisable. A combination of means is best at times, as, for instance, excision by the scissors and cauterization afterward.

Whatever method may be chosen the patient should first be placed in the lithotomy or in Sims's position, on the left side, which I prefer, and the part to be removed exposed by a speculum.

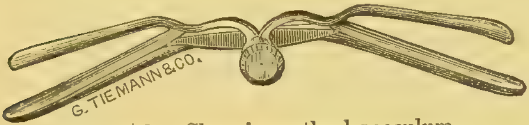

FIG. 273.—Skene's urethral speculum.

There are two instruments which I use for this purpose. The first is here shown, Fig. 273. It is made on the principle of Sims's speculum, the ends being of different sizes. An elevator is attached at the central portion between the blades, and so arranged that when it is closed on one blade it is thrown out from the other. This is seen in the figure. The elevator is pressed down on the blade, and the instrument introduced, and then by pressing on the other end of the elevator the urethra is distended to its full natural capacity. When it is necessary to expose one side of the urethra completely, the elevator should be removed, and the instrument used in the same way that Sims's speculum is employed in the examination of the vagina.

The other instrument is a modification of Folsom's nasal speculum, made of wire, Fig. 274. By turning the nut-screw the blades are closed, and the instrument is introduced; and by unscrewing it the elasticity of the handle throws the blades apart. This instrument answers well when the tumor to be removed is small, and we are obliged to operate without assistance. It is self-retaining. The other speculum is preferable in most cases, but, in operating through it, it is requisite that some one should hold it.

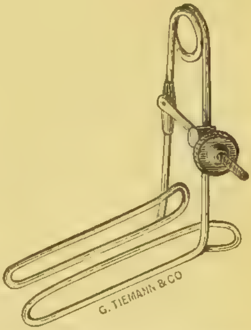

FIG. 274.—Skene's modification of Folsom's nasal speculum.

When the tumor is at or near the meatus, and has a large base, or if it is vascular and troublesome hæmorrhage is feared, removal by ligature is preferable. Having exposed the part with the speculum the base of the tumor is to be transfixed by passing a needle from without inward, parallel to the axis of the urethra; a ligature is then to be passed around under the needle, then the tumor is grasped with a forceps, and traction made so as to bring the sides of the base within the grasp of the ligature, which should then be tied slowly and as tightly as possible without cutting the tissues. By taking all these precautions the ligature will be certain to include all the abnormal tissue, a very important result indeed. If the base of the growth is too large to be included easily in one ligature, transfixion may be made with a needle armed with a double thread, and its two halves tied.

In choosing the material for a ligature, I would advise the use of fine plaited silk, boiled in a mixture of beeswax, carbolic and salicylic acids. A ligature prepared in this way ties easily, does not stick like the ordinary ligature, and, more than that, it does not slip.

If the tumor is within easy reach and is pedunculated, the pedicle can be seized with a small forceps, and the tumor grasped in a polypus-forceps, and removed by torsion. Or it can be cut off with the knife or scissors, and, if the pedicle inclines to bleed, touched with caustic. Allen's polypus-forceps for the ear will be found one of the most convenient instruments for taking hold of these little tumors, Fig. 275.

In cases where there are several small growths high up in the urethra, they can be removed with the curette, and, when the hæmorrhage has subsided, the base of each should be cauterized.

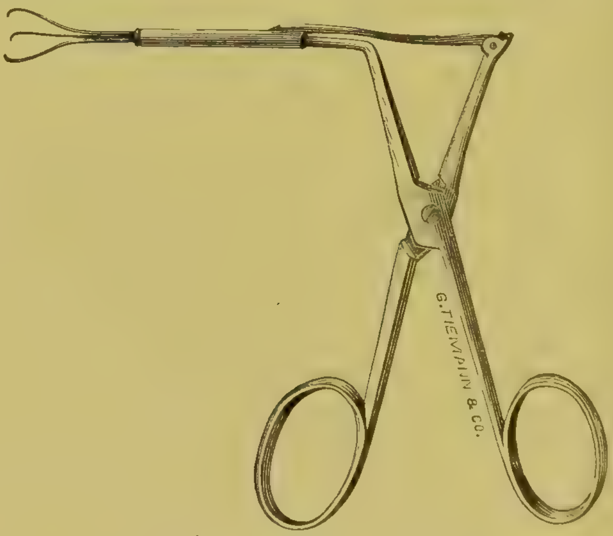

FIG. 275.—Allen's polypus forceps.

But little difficulty will be experienced in operating in the various ways described when the neoplasms are low down in the urethra, where they can be easily seen and handled. When they are high up in the canal, then great skill and care are required to remove them. In such cases success will be best obtained with the écraseur, or the instrument known as Blake's polypus-snare, used for removing polypi from the ear, Fig. 276. It is simply a very delicate écraseur, the chain or wire of which is tightened by the finger in place of a screw. It will be found that, instead of the wire commonly used, the steel-wire string of the zither is better; it is stronger, more elastic and pliable, yet stiff enough to be manageable. Dr. John W. S. Gouley, of New York, was the first to use this instrument for removing tumors of the urethra, and I can testify to its great value in such operations.

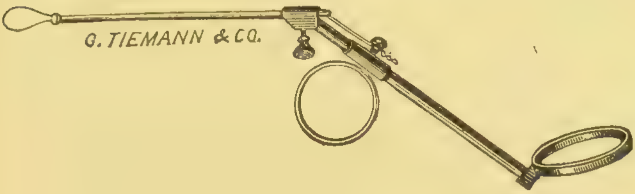

Fig. 276.—Blake's polypus snare.

In operating with the snare, the tumor is exposed with the urethral speculum; and, if the growth is pedunculated, the loop of wire is passed over it, and removal effected by constriction. When there is a broad base, the whole mass is seized with the polypus-forceps, and the snare is then passed over it and tightened until it comes away.

There is one accident that very often occurs in this operation, and that is breaking of the wire. This takes place, usually, just when the tumor is almost cut off, and it annoys and hinders the operator, but does not spoil the operation, as a new piece of wire can be used, and the operation completed. This accident can often be avoided by taking time. The base or pedicle of most of these growths will give way under long-continued pressure, but the wire will break if there is too much hurry.

In order to operate high up in the urethra, it is sometimes necessary to dilate its lower portion. A convenient way to do this is the following: Take a piece of fine rubber tubing and draw it over the blades of the Folsom speculum, and then introduce the instrument into the urethra. Open the blades, and let it distend the urethra as far as it can. To produce the extra dilatation, take a series of graduated sounds or dilators—wood or hard rubber will answer—and force one of these in between the blades of the speculum; remove that one, and use a size larger, and so on until the requisite amount of dilatation is obtained. The blades of the speculum and the rubber tubing protect the mucous membrane of the urethra from injury while passing in the dilator. The danger of incontinence of urine, which is liable to follow from forcible dilatation, can be avoided by distending the lower portion of the urethra only.

To obtain sufficient light for operating high up in the urethra, it is necessary to have clear sunlight; or, if that is not obtainable, gaslight should be used; and, in either case, the concave head-mirror should be employed.

Of late years the galvano-cautery has been very extensively used in surgery generally, and has been recommended for the removal of urethral tumors. As a means of removing large and vascular growths from the meatus, it has high claims, but for general use it will be found objectionable. In removing tumors from the interior of the urethra with this cautery, it is impossible to avoid cauterizing portions of the normal membrane unless extraordinary skill is employed. This unfortunate liability, and the difficulty in keeping the instrument in good working order, stand in the way of this means of operating ever becoming popular in this department of surgery.

Caustics have been more extensively used than any other means of removing urethral neoplasms, and I know of no better way of destroying small growths. Of all the agents used, I prefer pure nitric acid, which I use as follows: Exposing the tumor with the speculum, represented by Fig. 276, I wrap a little cotton around a probe, and dip it into the acid, and apply it to the part to be destroyed, taking care not to touch any of the normal tissues. The speculum recommended has the advantage of protecting one side of the canal, and, by exercising care in handling the acid, accidents may be avoided.

I come now to the last method of removing these tumors which I shall mention, viz., electrolysis. This means of treating abnormal growths has been employed so much lately that I need not dwell upon the method of its use, but simply state that those tumors that recur, and those that are suspected to be malignant, and those also that are so high up in the urethra as to be difficult to remove, should be treated by electrolysis. Two long, slender needles should be insulated by coating them with collodion, except at the points. These are attached to the electrodes of a galvanic battery, and their points introduced into the base of the tumor, and the current passed through until the whole of the abnormal tissue is decomposed. I prefer to use a current sufficiently strong to char the tumor, and thereby completely destroy it.

There is one rule which should be kept in mind in treating tumors of the urethra, and that is, to be sure to remove *all* the abnormal tissue. Whatever method is employed, no portion of that which ought to be removed should be left. I am confident that much of the trouble experienced by the repeated return of these growths might be avoided by a careful observance of this rule.

Urethral catarrh or inflammation, which frequently accompanies abnormal growths, usually subsides after their removal. In some cases it persists, and then it should be treated according to the methods already given.

CHAPTER XLIX.

ORGANIC DISEASES OF THE URETHRA (CONTINUED).

DILATATION, DISLOCATION, AND PROLAPSUS.

5. **Dilatation of the Urethra.**—Changes in the caliber of the female urethra occur in two forms, dilatation and contraction; but neither of these is very often met with in practice. Of the two, dilatation is the more common. The increase in the size of the urethra may involve the whole canal, or be limited to a portion of it. I will first speak of dilatation of the whole urethra, and then, dividing the canal into thirds, consider the affection of each portion.

Dilatation of the Whole Urethra.—It will be understood that dilatation to such an extent as to have the canal open and its walls separated is an unknown condition. The true state of things would be more correctly expressed by calling it an abnormal dilatability. The tissues of the walls of the urethra are in such a relaxed condition as to admit of extraordinary distention without injury. Dilatation of the whole urethra is not so common as dilatation of a portion. Even when the whole canal is larger than it should be, it will generally be found that it is not uniformly so. Some portions of it are more distended than others. The extent to which this dilatation may occur is very great. A number of cases are recorded, especially in the German literature of the subject, where copulation took place for years in the urethra instead of the vagina. In these cases the dilatation was extreme.

In this affection the urethral walls and the urethro-vaginal septum are usually relaxed and flabby. After a considerable time they may become indurated by infiltration, or by hyperplasia of the connective tissue. The mucous membrane is usually soft and loosely adherent to the subjacent tissues. Beneath the membrane will sometimes be found masses of enlarged veins, which give a dark-bluish appearance to the parts. If the meatus be distended like the rest of the urethra, the mucous membrane, with the large veins beneath it, may protrude and form tumors, which will have quite the appearance of rectal hæmorrhoids. This is especially so when the veins are large and numerous, and the mucous membrane thin, so that the color of the veins can be seen through it. On the other hand, if the meatus remains normal in size nothing will be seen by the examiner until the catheter or sound is passed into the urethra, when the distended or distensible condition of the canal will be detected. The dilatation can easily be made out, even when the meatus is normal in size, by observing that the sound can be moved about in the urethra, conveying the same impression to the hand as when it passes into the bladder. By making a digital examination of the vagina the enlarged urethra can be felt, and is usually elastic and compressible. Through Sims's speculum the abnormal fullness or bulging of the anterior vaginal wall can be plainly seen and distinguished from displacement of the urethra. The points of difference between dilatation and displacement will be brought out more in detail further on.

When the dilatation has existed for any length of time, the mucous membrane is usually hyperæmic and sometimes catarrhal, secreting a muco-purulent material, which may be seen escaping from the meatus, or lodged in the folds of the membrane, where it can be observed through the endoscope. When the mucous membrane is prolapsed and forms a tumor outside of the meatus, it soon becomes fissured and ulcerated, and consequently very tender and painful. This condition is produced by the retarded circulation, chafing, and the irritation from exposure to the air, and the urine passing over it.

Dilatation of the Anterior or Lower Third.—This is the rarest of all the forms of urethral dilatation, and occurs usually as a consequence of some enlargement or swelling of the mucous membrane, neoplasm of the urethra, or mechanical dilatation. The dilatation may include the meatus or it may not. In rare cases it does not at first, but later in the course of the trouble the enlarged mucous membrane slowly, sometimes rapidly, dilates the orifice. The general appearances of the parts are the same as those of which I have spoken under the head of dilatation of the whole urethra. When the dilatation is due to any abnormal growth in the urethra, the conditions presented will be the same as those already described under the head of urethral neoplasms.

I have seen but one case where the lower end of the urethra was dilated without any recognizable cause for it. This was a single lady, thirty-five years of age, a school-teacher. She had displacement of the uterus and catarrh of the cervical canal, for which she consulted me. She had no trouble with her urinary organs. While examining the uterus I noticed that the meatus urinarius was peculiarly formed. In place of the concentric corrugations of the mucous membrane which form the closed meatus, the orifice was funnel-shaped, and lay open when the labia minora were separated. About half an inch of the lower end of the urethra admitted a No. 21 (English) sound. The remainder of the urethra was normal, and there were no signs of disease about the mucous membrane of the dilated portion. I could obtain no history which pointed to the origin of the dilatation, and it caused no discomfort to the patient.

Dilatation of the Posterior or Upper Third.—This form of dilatation usually occurs in connection with other pathological conditions, such as prolapsus of the bladder and urethra. On this account I will defer what is to be said on this subject until I come to dislocations of the urethra.

Dilatation of the Middle Third of the Urethra.—Dilatation of this part of the urethra is more common than either of those I have described. I do not desire to be understood as saying, that it is confined to exactly the middle third of the urethra, or that the other dilatations are confined to thirds only. It is about a third, and I use the division to fix the idea clearly in the mind and for convenience of description.

In this form of dilatation the anterior wall of the urethra maintains its normal position, but the central portion of the canal being distended settles down, so that in time the urethra, in place of being a straight or slightly curved canal, becomes triangular, the upper wall being the base, and the central portion of the posterior wall (that is midway between the neck of the bladder and the meatus) the apex. A cavity is thus formed in the central portion of the urethra. Fig. 277 will convey the idea of the anatomical appearances of this affection.

This form of dilatation has been called sacculated urethra and urethrocele. A valuable article on this subject will be found in the "American Journal of Obstetrics" for February, 1871, by Nathan Bozeman, M. D. Some of the cases related there by him are, in my opinion, not simply urethral dilatation alone, but dilatation and dislocation combined. However, his description of this form of trouble is the best that I have ever seen, and I prefer to give it in his own words. It is as follows:

"In the study of urethrocele, the anatomical points to be considered are the triangular ligament and its relations with the urethra, the muscular structure of the urethra, and the different relations of the urethra to the vagina in the upper and lower parts of its course.

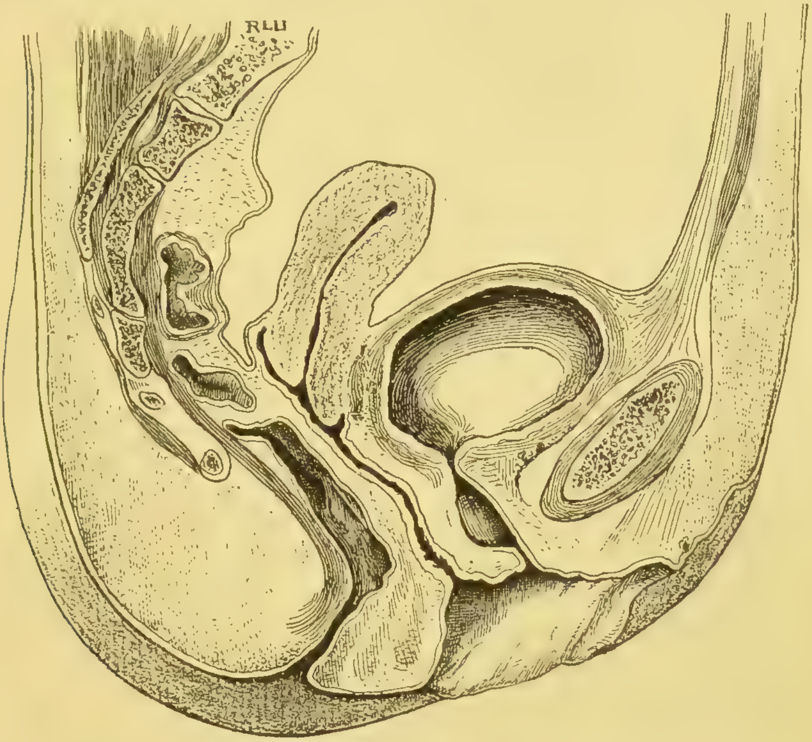

FIG. 277.—Dilatation of middle third of the urethra (urethrocele).

"These anatomical peculiarities exert a marked influence on the etiology of the lesions in question, and supply the first links in the long chain of morbid results indicated by the histories of the cases above cited, and others known sometimes to follow.

"In the male, stricture, although not the first morbid alteration, denotes the first serious interruption of the stream of urine, and superinduces morbid changes in the urethra above the prostate gland, in the bladder, the ureters, and the kidneys.

"In the female, rare as it is to meet with organic stricture of the same kind as in the male, the caliber of the canal is quite as often, if not oftener, compromised, and with due allowance for the anatomical differences of sex, the pathologic sequences observe the same order.

"The starting-point of urethral and vesical lesions in the female is to be sought in the lower half of the urethra, closely related in front with the triangular ligament, and blending behind with the spongy erectile tissue of the vagina.

"The caliber of the urethra may be transiently narrowed by congestion of its mucous lining, or permanently narrowed by infiltration of coagulable lymph into the underlying cellulo-elastic tissue, which constitutes properly the so-called organic stricture, as in the male, and which, however seldom met with, is liable to the same sequences.

"Infiltration into the spongy erectile tissue outside the urethra, by plastic lymph, is, I believe, by far the most common beginning of the morbid process, whatever be the cause that produces it. This interrupts the stream of urine, either by encroaching on the caliber of the urethra, or by deflecting it beneath the triangular ligament, both cases being attended with more or less dilatation above.

"The next step in sequence is increased functional activity of the urethral muscular coat in overcoming the obstruction to the flow of urine. The result upon its structure is hypertrophy, and this will be of the eccentric type, thickening the urethral walls while enlarging the caliber. Hence the ease with which large catheters of a proper curve pass at all stages of the disease. False and true hypertrophy here coexist. The true hypertrophy increases *pari passu* with the muscular contraction, and is followed by still greater distortion of the canal, at an angle more and more acute, as it turns the triangular ligament, and with corresponding coarctation of its walls at that point. This mechanical impediment below coincides with the increased weight and volume of the stream of urine above, to put the walls of the urethra on the stretch in the upper part of its course.

"Thus is gradually formed the urinous tumor, which drags down in front the adjacent vaginal wall, appearing as a prolapsus between the nymphæ, and filling up the ostium vaginæ.

"The looser attachment of the urethra to the vagina in the upper part of its course facilitates this result. Such is the condition of the parts to which I apply the term urethrocele. Often confounded with cystocele, it is really distinct.

"The arrest and retention of but a few drops of urine at first goes on until this may amount to a teaspoonful or more. It is then decomposed in this pocket, becomes alkaline, and by its irritation provokes congestion of the urethral mucous membrane."

In the earlier stages of this affection the urethra in front and behind the pouch is really or apparently contracted; but as the disease progresses the upper part of the canal and the neck of the bladder become dislocated downward, and finally the upper portion of the urethra becomes also dilated to some extent.

There is in this, as in the other forms of urethral dilatation, frequent urination, usually more marked; but unlike the others, there is difficulty in passing water. This frequency of urination, and the straining efforts necessary, affect the bladder, producing irritation, and, in time, hypertrophy of its walls. Cystitis also follows in the order of morbid developments; but whether that comes from the frequent and difficult urination, or from extension of the inflammation from the urethra to the bladder, is a question. One thing we know, and that is, that if this form of urethral dilatation goes on without treatment, cystitis will sooner or later appear.

Symptomatology.—The symptoms vary according to the extent of the dilatation, the portion of the urethra involved, and the condition of the mucous membrane. When the whole urethra is dilated, the only symptom present may be frequent urination. When there is inflammation or prolapsus of the mucous membrane, then pain will be caused by micturition, and the desire to micturate will be more urgent and frequent. The patient may also be annoyed by a slight loss of control of the bladder, under the pressure of lifting heavy weights or coughing.

Dilatatation of the lower third of the urethra does not cause any derangement of function, unless accompanied with inflammation or ulceration; then there will be frequent urination possibly, painful urination certainly. The symptoms in this form of dilatation are less marked than in the other varieties.

When the trouble is located in the upper third of the urethra, the symptoms are sometimes very distressing. In addition to the frequent—it may be constant—desire to pass water, the patient is tormented with partial incontinence. Coughing, laughing, sneezing, stooping to lift anything, a jar on stepping from the curbstone in crossing the street, causes an escape of urine. This distresses the patient very greatly. She is not troubled so long as she keeps quiet, or at least she suffers only from frequent urination; but as soon as she undertakes the usual duties of exercise or enjoyment, then this partial incontinence makes her miserable. From the constant wetting of the external parts they become inflamed, unless very great care is taken to keep them dry and clean. In some of these cases the mortification is sometimes more distressing than the physical suffering.

The symptoms occurring in dilatation of the middle portion of the urethra (urethrocele) are the same as those already given, with the addition of a slight mechanical obstruction, which causes difficult urination. That is, more voluntary effort is necessary on the part of the patient to empty the bladder. The forcing, straining efforts made by some of these patients while urinating are even greater than the mechanical obstruction appears to account for. This may be due to the accumulation of urine in the urethra, which excites extra reflex action in the bladder and urethra out of proportion to the obstruction. This is the only way that I can account for the difficult urination and muscular hypertrophy found in these cases in which there is no obstruction from stricture.

The constitutional symptoms arising from these urethral troubles are the same as those produced by urethritis, and are not peculiar to this class of affections. In fact it will be observed that the symptoms here given may all be produced by other pathological conditions, and consequently can not alone guide to correct diagnoses. The clinical history in such cases leads us to suspect the nature of the disease, but the true character of the trouble can only be discovered by physical exploration.

Diagnosis.—In dilatation of the whole urethra, a digital examination will detect the increased space occupied by the urethra. The canal encroaches upon the anterior vaginal wall, and feels like a ridge extending from the meatus to the neck of the bladder. This elevation or thickening of the urethra is elastic and compressible in recent cases; in those of long standing where there is hypertrophy, the tissues are firm to the touch, but still the canal is compressible. The extent of the dilatation can be measured by the size of the sound that can be easily passed. If even the ordinary female catheter is at hand an idea of the size of the canal may be obtained. By introducing that instrument and pressing it first against the anterior wall and then upon the posterior, the distance between the two can be approximately made out. While the catheter or sound is in the urethra the finger should be introduced into the vagina and the thickness of the urethral wall ascertained. This will give a good idea of the increase of tissue from inflammatory products or hypertrophy.

When the meatus is dilated and the mucous membrane and enlarged vessels are prolapsed, care must be exercised to distinguish that condition from urethral neoplasm. This can be done by observing that in prolapsus the opening is situated either at the upper side or in the center of the protruding mass, whereas in abnormal growths of the urethra the meatus surrounds the tumor or its pedicle. More than that, by making pressure on the distended vessels the size of the prolapsed membrane can be reduced, and the membrane can be pushed up into the canal. This can not usually be done with tumors.

Dilatation of the lower third of the urethra is easily diagnosticated. A large sound will pass in as far as the dilatation extends, and will be arrested when it comes to that portion of the canal which has a normal caliber.

Great difficulty will be encountered in the diagnosis of dilatation of the upper third of the urethra, but by attention to the following points success will usually follow. By using the sound it will be observed that while the lower portion of the canal hugs the instrument firmly, the point of it can be moved freely in the upper part of the passage. The same impression is conveyed through the instrument as that which is experienced when the sound enters the bladder; only in dilatation of the upper portion of the urethra, the motion of the point of the sound is, of course, more limited. Again, by introducing a curved sound, and with it holding the anterior wall of the urethra well up under the arch of the pubes, and then carrying the finger of the other hand along the anterior vaginal wall, the posterior wall of the urethra will be found to hug the sound until the dilated portion is reached; this will be felt to lie away from the instrument. By pushing up the vaginal and urethral walls at the point of dilatation until they touch the sound, and then by removing the pressure and allowing the parts to recede from the sound, the relaxation can be easily detected.

In some well-marked cases of dilatation complicated with prolapsus of the upper portion of the urethra, the diagnosis can be clearly made, by slowly introducing the catheter until the urine begins to flow, and then marking the catheter at the meatus urinarius and withdrawing it. The distance from the mark made to the upper edge of the eye of the catheter indicates the length of the normal portion of the urethra. If that is subtracted from the normal length of the urethra, the remainder will indicate the length of the dilated portion.

Dilatation of the middle third of the urethra—urethrocele—is most likely to be confounded with thickening of the urethro-vaginal septum. The diagnosis is made by observing that the enlargement due to dilatation corresponds to the central portion of the urethra, and that it yields to pressure more or less. Also, by passing a curved sound with the point upward, the anterior wall of the urethra will be found to occupy its normal position. Withdrawing the sound and again introducing it with the point downward it will pass inward and then down into the pocket found at the point of dilatation, where it can be felt through the vaginal wall.

In all cases, except one, that have come under my observation, the diagnosis has been easily made by this method of examination.

The exception referred to was a case of periurethral inflammation, in which an abscess formed in the urethro-vaginal septum and discharged into the urethra. A fistulous opening from the floor of the urethra into the sac of the abscess remained. The urethra occupied its normal position, and admitted the sound easily; and by introducing it with the point downward it passed into the sac of the abscess, thus giving the physical signs of urethrocele; but the small size of the opening in the floor of the urethra, the marked infiltration and induration of the tissues, and the history of the case, led to a diagnosis of its true character.

Prognosis.—There is no natural tendency to recovery in these affections. If left alone they generally get worse; recovery under treatment is modified by the location of the dilatation and the duration of the trouble. The conditions upon which an unfavorable prognosis is to be based are bladder complications, inflammation or ulceration near the neck of the bladder, great varicosity of the veins, and fatty degeneration of the muscular tissue. In the absence of all these complications a complete cure can be obtained. In all cases great relief can be secured by treatment, and the patient guarded from getting worse.

Causation.—The hyperæmia of the urethra which occurs in pregnancy, and which tends to produce overdistention of the veins, favors dilatation of the whole urethra. It is not uncommon to find an apparent increase of tissue in the walls of the urethra during utero-gestation, and the dilatability of the canal is often increased also. This condition of the parts disappears during the involution which takes place after delivery; but when from any cause the process of involution is interrupted, the enlarged vessels and relaxed condition of the urethral walls remain and sometimes increase. When to this state of the parts a catarrh of the mucous membrane is added, the enlargement of the membrane by swelling still further increases the caliber of the canal.

The dilatation caused by passing calculi may remain permanently, and the same may be said of the use of large sounds. Neoplasms obstructing the meatus, or stricture at that point, may so obstruct the escape of the urine as to cause dilatation at all points above. This is no doubt one of the most important and frequent causes of dilatation. Indeed, the recognition of this fact has led to the suggestion of treating stricture of the upper portions of the urethra by compressing the meatus, and then forcing the urine into the urethra and retaining it there.

I have already stated that dilatation of the lower third of the urethra is rare, and is usually due to inflammation of the mucous membrane at that point or to abnormal growths, the distention remaining after the causes that produced it have been removed. This and mechanical dilatation from any cause cover the etiology of this form of the dilatation. Baker Brown says that the meatus is always dilated when there is stone in the bladder.

Regarding dilatation of the upper third of the urethra, I am inclined to believe that it occurs in consequence of a partial prolapsus of the bladder and the upper end of the urethra. The displacement of these parts implies a relaxation of the tissues, caused originally, it may be, by injuries during confinement, and the prolapsus permits an unusual pressure of the urine upon the upper end of the urethra, and dilatation is the result. On the other hand, the prolapsus and the accompanying relaxation of the urethral walls may be sufficient to cause the dilatation, and the whole trouble can invariably be traced to child-bearing or anteversion of the uterus. The fact that the upper part of the urethra is torn from its attachment to the subpubic ligament, and thereby deprived of its normal supports, would incline it to dilate, and I presume that this is oftentimes the cause of the dilatation.

One cause of dilatation of the middle third of the urethra (urethrocele) has been sufficiently dwelt upon in Bozeman's description of the pathology of that affection—that is, narrowing of the lower end of the urethra. This does not explain the etiology of all cases, however, for I have seen this form of dilatation where there was no stricture or hypertrophy of the lower end of the urethra. In such cases I have traced the cause to childbirth, during which the posterior wall of the urethra had been pushed downward and contused, while the upper remained in its normal position. The relaxation caused by this overstretching of the urethral wall formed a small pocket in the central portion, which gradually dilated more and more by the pressure of the urine until the urethrocele was fully developed. This explanation of the cause may be rather hypothetical, but, so far as my observations go, it agrees with the facts found in those cases which can not be accounted for by Bozeman's views on the pathology of this affection.

Treatment.—In the management of all forms of urethral dilatation, any inflammation of the mucous membrane that may exist should be relieved by employing the usual methods of treatment of urethritis. When there is a relaxed and prolapsed condition of the mucous membrane, astringents should be used to overcome it. Tannic acid will answer well. When these fail, the redundant membrane should be retrenched, either by touching it with the thermo-cautery or excising a portion with the scissors. In employing the cautery for this purpose, the long-pointed tip of the instrument which is used for cauterizing hæmorrhoids by puncture should be chosen, and, having protected one side of the urethra with the speculum, a narrow strip of the membrane parallel to the axis of the canal shall be cauterized. Two or more of these cauterizations may be made at points equidistant on the circumference of the urethra. Operating in this way leaves pieces of normal membrane between the portions cauterized, which prevents stricture from occurring after healing—a misfortune which is sure to follow if the mucous membrane is destroyed by cauterization all round.

In excising the prolapsed portion, I prefer to remove one or more V-shaped portions on opposite sides, and bring the edges together by sutures. This is preferable to clipping off the whole of the protruding mass, because the cicatrices left are less likely to give after-trouble by contraction.

When the dilatation is caused by varicose veins, it may be well to follow the example of Gustave Simon. He exposed the vessels by cutting through the vaginal wall, ligated the largest, and arrested the hæmorrhage from the smaller ones by applying liquor ferri perchloridi. He repeated this operation several times on the same patient, who experienced little or no inconvenience from the proceedings, and made a good recovery.

Dilatation of the lower third of the urethra is usually secondary to some other trouble, as I have already stated, and all that the physician will usually be called upon to do for such cases is to remove the cause and treat any inflammation that may exist. The dilatation will then disappear, and, if it does not, but little, if any, trouble will result.

The treatment of dilatation of the upper third consists simply in supporting the parts. This can be effectually done by using the pessary already recommended for the relief of prolapsus of the bladder. It will be necessary to have the instrument so formed as to bring the pressure where it is required. This can easily be done by placing the pessary in position, and observing what change of form, if any, is necessary, and then directing the instrument-maker to make the alteration. If the parts are well supported in this way, recovery will follow, unless atrophy of the muscular wall has previously taken place. Even then the patient can be kept comfortable by wearing the pessary. If there is urethritis present, it may be necessary to relieve that before using the pessary; otherwise, the pressure of the instrument may cause pain, and aggravate the inflammation.

This brings me to the only remaining form of this affection to be mentioned—dilatation of the middle third, or urethrocele. Dr. Bozeman has proposed making an opening into the most dependent part of the urethra through the vaginal wall, and maintaining it until all inflammation has been relieved, and then closing the opening by the usual plastic operation. By this means the urethra is perfectly drained of urine and the products of inflammation which accumulated there before. This, with appropriate cleansing and topical applications, soon restores the mucous membrane to its normal condition, and the removal of the redundant tissue during the operation of closing the opening effectually cures the whole trouble. This treatment is admirably adapted to marked cases of long standing, and should be employed. By using the thermo-cautery to make the opening, the operation is easily performed. In recent cases of less severity, I have obtained satisfactory results by dilating the lower part of the urethra, and supporting the dilated portion either with a pessary or a tampon of marine lint. This permits the urethra to keep itself empty, and then, by frequently washing it out and applying such remedies as will cure the urethritis, recovery will sometimes follow. This treatment can be tried, and, if it fails, Bozeman's method can be resorted to. Dr. T. A. Emmet has extended the usefulness of this operation. He calls it button-holing the urethra, and employs the operation for diagnostic purposes as well as for the cure of various affections of the urethra and bladder. I have tried this operation as faithfully as I could, and find that it is easily performed by using a scissors modified, but like the button-hole scissors used by tailors (Fig. 278).

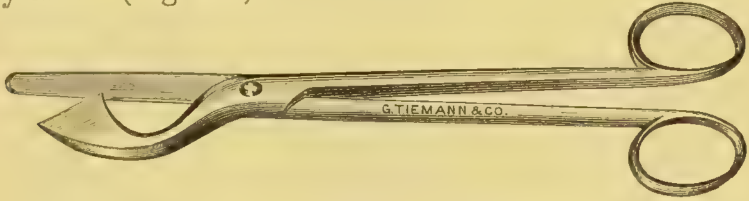

FIG. 278.—Button-hole scissors (Skene).

The probe-pointed blade is introduced into the urethra, and the short blade into the vagina as far as the point at which the opening is to be made. One clip usually is sufficient, but if a larger opening be desired, it can be made by carrying the scissors up or down, and dividing as much more of the septum as may be desired.

This operation is most thoroughly efficient for the purpose designated for it by Dr. Bozeman, and it is also a convenient way of removing neoplasms situated in the middle and upper thirds of the urethra, when they can not be easily reached through the meatus urinarius. In regard to this operation, as a means of diagnosis, I have not been able to discover that it has any advantages, either to the patient or surgeon, over the methods I have already described. On the contrary, so far as simplicity, safety, facility, and efficiency are concerned, it is very inferior.

6. **Dislocations of the Urethra.**—This is one of the affections that will frequently be met with in practice, although very little is said about it in text-books. I have found very few cases recorded in medical literature. This neglect of the subject by authors is perhaps due to the fact that in many cases of displacement of the urethra, the bladder is also dislocated, and the whole trouble is described under the head of vesicocele or cystocele. Now it is true that displacement of the two occurs together, but it will also be found that either may take place alone. It is not by any means uncommon to find prolapsus of the bladder while the urethra is in its normal position, and occasionally a case will occur in which the urethra is prolapsed, while thebladder remains in its proper place.

The urethra is subject to displacement upward and downward. In pelvic tumors the bladder is sometimes pushed up out of the pelvic cavity, and the urethra dragged along with it. Usually no harm comes from this displacement, except that it may cause some difficulty in using the catheter, should this be necessary; hence I need not dwell on this part of the subject. Dislocations downward are the most important because they occur more frequently, and almost invariably cause suffering to those so affected.

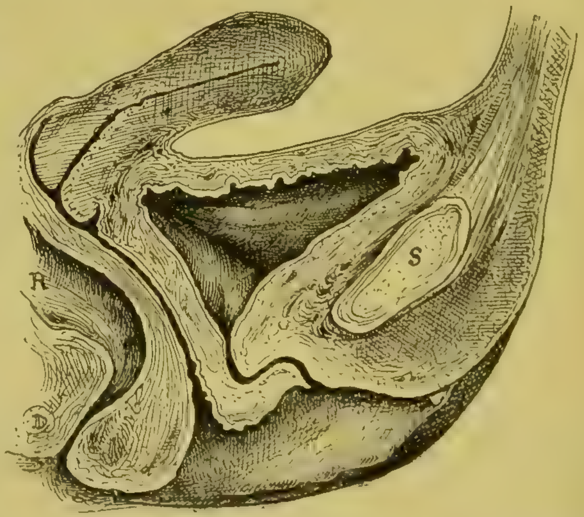

Fig. 279.—Dislocation of the upper third of the urethra. s, symphysis pubis; r, rectum.

The extent of displacement varies exceedingly, but I shall describe only the partial and the complete. A clear comprehension of these two degrees will cover all intermediate forms. In partial displacement downward, the upper two thirds of the urethra are prolapsed, so that the direction of that portion of the canal is backward, instead of curving upward, as in the normal condition. Fig. 279 will convey the idea of this degree of dislocation.

In complete prolapsus the urethra runs from the meatus (which is in its normal position) backward, and rests upon the perinæum; or in extreme cases, accompanied with prolapsus of the bladder and uterus, its direction is backward and downward; the position of the vesical end of the urethra being below the level of the meatus. In this degree of displacement the urethra and bladder can be seen presenting at the vulva, or lying between the labia minora or thighs.

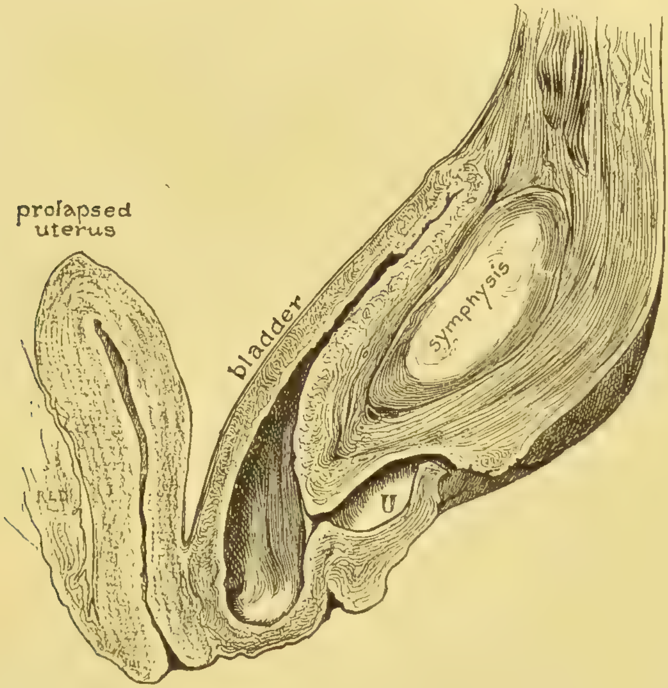

Fig. 280.—Complete dislocation of the urethra with dilatation. U, urethra.

The urethra is usually shortened considerably when the prolapsus is marked. Fig. 280 illustrates complete dislocation.

Symptomatology.—The symptoms arising from displacement of the urethra are much the same as those found in dilatation and other urethral diseases. I need not, therefore, repeat them in detail. Suffice it to say, that in dislocation of the upper portion of the canal, there is, in addition to frequent urination, a partial loss of control of the bladder. Under the extra pressure of coughing, for example, the urine will escape. This loss of control does not exist, as a rule, in complete displacement. On the contrary, there is usually difficult urination, which requires increased voluntary efforts to empty the bladder. In some cases the bladder can not be emptied until it is pushed up into position. In all degrees of displacement, the symptoms are increased in the erect position, and are markedly relieved when the patient lies down.

Diagnosis.—An examination of the vagina, either by the touch or speculum, will reveal the downward projection of part or all of the urethra, which will demonstrate that there is either dilatation or prolapsus. The two conditions can then be differentiated by the use of the sound. The change in the direction of the canal will be shown as the sound passes in, and dilatation can be excluded by observing that the urethra grasps the instrument firmly at all points. In dislocation of the upper two thirds of the urethra, it will be found that the sound passes in the normal direction, but is arrested at half or three quarters of an inch from the meatus; but, by pushing up the vaginal wall and the urethra, the sound will then pass into the bladder. When the prolapsus is complete, the instrument passes in easily, but takes a downward and backward direction.

Prognosis.—Uncomplicated displacement of the urethra can be remedied in the great majority of cases, if the trouble has not been of long standing. By placing the parts in proper position, and holding them there, the relaxed tissues will usually contract sufficiently to support themselves. Should they fail to do so, the patient can be at least made comfortable by wearing some supporter. In many cases the pelvic floor is imperfect, and by restoring it and bringing the parts together high up the urethra will be kept in place by the natural supports.

Causation.—Utero-gestation and delivery are the most important causes of this affection. In the advanced months of pregnancy I have observed that, while the bladder rose above the pubes, the urethra was pushed slightly downward by the settling of the enlarged uterus into the pelvis. In such cases, when labor occurs, the head of the child dislocates the urethra still more, by pushing it still farther down. This process I have often watched in forceps delivery. When the child's head is large, and there is a partial prolapsus of the urethra existing before the forceps are applied, one can see during traction that the urethra and anterior vaginal wall are forced down before the advancing head, and that, too, while counter-pressure to prevent it is being made. The displacement produced in this way is often corrected during convalescence, if proper care be taken to push the parts back into place, and the patient kept at rest until the tissues regain their tonicity. But in many cases the trouble is overlooked, and, by permitting the patient to get up and be on her feet while there is still prolapsus, it will slowly increase, until the dislocation is complete. This will surely be the case if there is any loss of perinæum. Indeed, rupture of the perinæum is an accident which permits the urethra to descend from its place. I believe that the perinæum supports the vaginal walls, which in turn support the urethra; and if the perinæum is lost, even in part, the vaginal walls become relaxed, or perhaps never regain their tonicity after delivery, and, settling down more and more, carry the urethra with them. I need hardly repeat what has already been said, that displacements of the uterus often cause malposition of the bladder and urethra.

Treatment.—When the displacement of the urethra is caused by any other affection, such as defective perinæum or prolapsus uteri, then these things should first be attended to. Should there be urethritis, that also should receive appropriate treatment. But the chief indication is to retain the urethra in place, and this may be accomplished by using the pessary which has been recommended for supporting the prolapsed bladder. Prolapsus of the upper part of the urethra can be remedied in this way quite satisfactorily. When the whole urethra is displaced this instrument, while it supports the upper part, will still permit the middle portion of the urethra to settle down. This may be remedied by making the anterior portion of the pessary long enough to engage in the introitus vulvæ, and in that way keep the whole canal where it should be. Should this cause the patient much discomfort the vagina may be tamponed with marine lint, and the parts kept in position until the trouble is partially overcome, and then the pessary will complete the treatment.

ILLUSTRATIVE CASE.

By way of illustrating what has been said on this subject, I will give the history of a case which may be accepted as a fair representative of such as will oftentimes be met in practice.

A lady, fifty-seven years of age, who had borne seven children, and possessed excellent general health, was very much troubled by a partial loss of control over the bladder. While at rest she had no difficulty, but on coughing, laughing, stooping, or lifting any heavy weight, the urine would escape in spite of her efforts to control it. I found the upper two thirds of the urethra displaced downward. Upon separating the labia, the urethra and vaginal wall presented just within the introitus, like the tumor seen in prolapsus of the anterior vaginal wall or cystocele. Introducing the catheter, I observed that it passed in the usual direction for about three eighths or half an inch, and then turned downward and backward, in the direction of the hollow of the sacrum. I also satisfied myself that the urethra was not dilated, by observing that it grasped the catheter firmly throughout its whole extent. It was shortened to about an inch. This I ascertained by slowly passing the catheter until the urine began to flow, and then withdrawing the instrument and measuring from its eye to the point marked at the meatus urinarius.

A pessary was fitted to keep the parts in place, and very marked relief was at once secured.

From the nature of the dislocation, and the very prompt relief following the treatment, I am inclined to think that the incontinence in cases such as this is due to the settling down of the upper portion of the urethra, by which the pressure of the bladder and its contents falls directly on the sphincter vesicæ, and overcomes its resisting power. Whether this is the correct explanation or not, one thing is certain, and that is, that cases like the foregoing are often met in practice, and the treatment of restoring the dislocated urethra gives prompt relief.

It must not be supposed from what has been said about this case, that the partial loss of retentive power in the bladder so frequently met with in women who have borne children, is always due to dislocation of the urethra. The following case will illustrate sufficiently well a class whose symptoms might lead to the suspicion of dislocation of the urethra when it did not exist:

A lady, fifty-five years of age, the mother of six children, consulted me on the subject of her urinary troubles. She said that she was obliged to urinate oftener than she used to, and that she could not stand or walk for any length of time without being annoyed by the dribbling of urine.

She was rather out of health. Her digestion was labored, and she was anæmic and easily fatigued. Dislocation of the urethra was suspected, but upon examination the pelvic organs were all in proper position and free from disease, except that there was a want of muscular tonicity of the perinæum and vagina. The urethra was congested throughout its entire extent, and supersensitive, especially at its upper portion. There was also some slight dilatation, or abnormal dilatability, of the upper two thirds of the canal.

She was treated with vaginal injections of cold water, applications of tannin in solution to the urethra, and tonics, including small doses of nux vomica. As her general health improved, the urinary troubles gradually left her. This case properly belongs to the class of dilatations, but is given here to show its resemblance to that of dislocations.

PLATE IX.

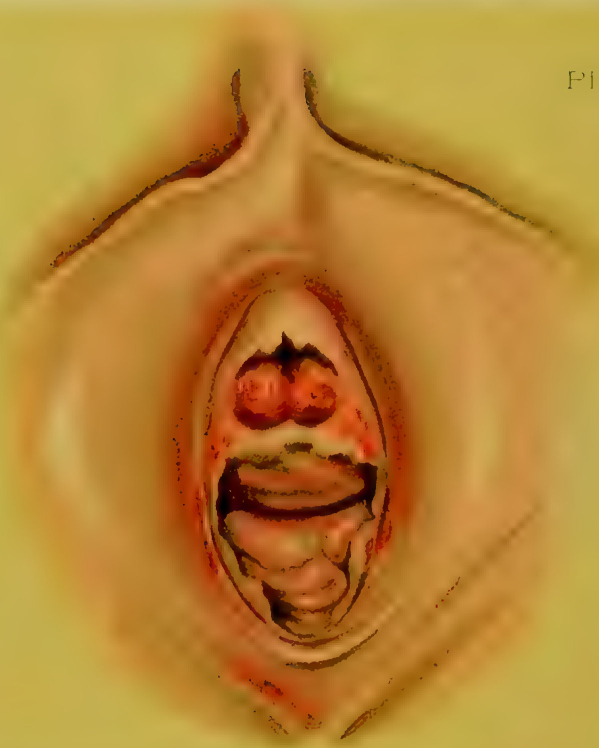

FIG 282
PAGE 946.

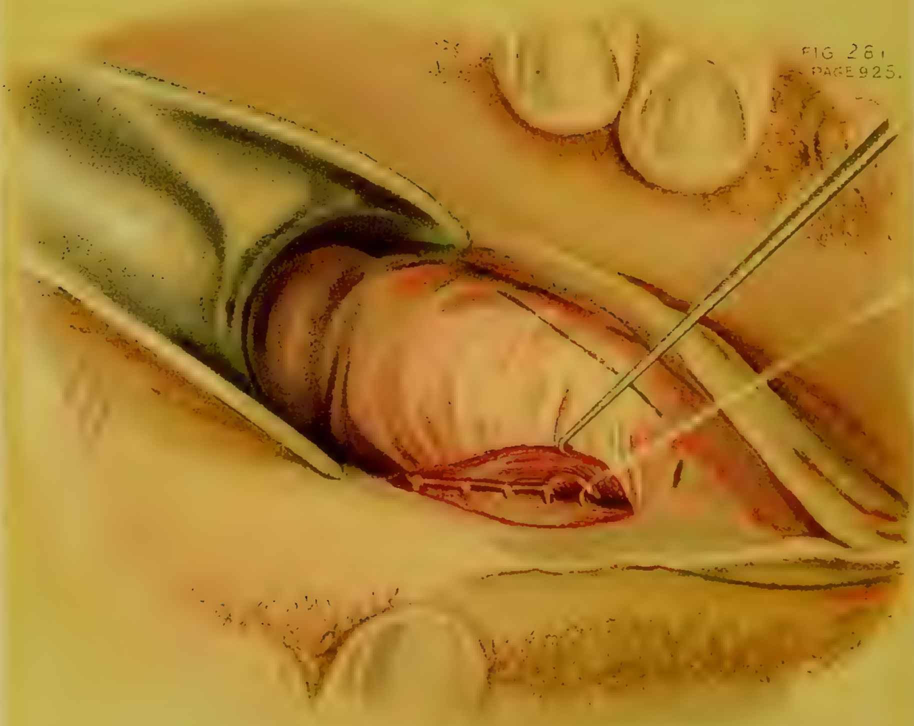

FIG 281
PAGE 925.

The failure (in certain cases) of all methods of treatment led me to devise the following operation for the relief of prolapsus of the urethra. An incision is made on each side of the urethra down through the vaginal wall, and extending from half an inch within the vulva upward and outward an inch or more. The edges of the wounds are retracted, and with a buried catgut suture the tissues below the vaginal wall are drawn together and at the same time united to the fascia which forms the subpubic ligament. Another row of sutures unites the deeper portion of the vaginal wall, and the third closes the surface portion of the wound.

No tissue at all is removed. The object of the operation is to gather together the tissues on each side of the urethra and unite them to the fascia above. See Fig. 281, Plate IV.

I am unable to speak from sufficient experience regarding the results of this operation, but it promises to be of great value.

Prolapsus or Inversion of the Urethral Mucous Membrane.—This subject has been already spoken of in connection with urethral dilatations, and little more need be said about it, except to mention that it occasionally occurs as a distinct affection. In fact the membrane can not become inverted unless there is a change in its structure and its relations to the tissues beneath it. Hence it must in all cases be a secondary affection. The membrane must be increased in extent of surface, either from relaxation of its fibers or hyperplasia, and its basic attachments be loosened, before it can be prolapsed. These changes are doubtless the result of malnutrition in the form of degeneration.

The prolapse may be limited to one side, or extend all around the canal. The size and extent of the protrusion varies considerably. If the meatus is of full size, the prolapsed portion will usually preserve its natural color for a time; but after a while, from chafing when wet with urine, and especially if not kept clean, it will become red and œdematous. When the meatus is small, these changes occur sooner and in a more marked degree, because the prolapsed portion is partially strangulated.

The longer the membrane remains exposed, the more sensitive it becomes, and the frequency of urination and pain attending it increases. It also becomes very tender and painful to the touch. In marked cases the ordinary movements of the body irritate the parts, and in that way render walking painful.

These are symptoms that closely resemble those of irritable growths at the meatus urinarius; and, so far as history is concerned, it will not be possible to make a differential diagnosis. To do this it is necessary to make a local examination. The physical signs, and the points in the diagnosis between this affection and other diseases, have been given briefly but sufficiently, under the head of dilatations of the urethra, and need not be repeated here.

Prognosis.—This disease does not yield promptly to mild treatment, unless it is seen early in its progress; and if it does yield to mild, soothing, and astringent applications, it is liable to return. But in case there is no other disease present that tends to keep it up, it can usually be cured by surgical means.

Causation.—The causes of prolapsus of the urethral mucous membrane are numerous, but those that are best known are long continued congestion, urethral and cystic irritation, causing frequent urination, and vesical tenesmus. Chlorotic and greatly debilitated women are said to be predisposed to it, as also old prostitutes. The few cases that I have seen were in women over fifty years of age, and all of them were weak, nervous patients, who had suffered from some organic disease or functional derangement of the urinary organs.

When a case is first seen it is well to remove any inflammation or other complicating conditions. The prolapsed membrane should be replaced, and the patient kept quiet in bed, to favor the retention of the parts *in situ*. Astringents, such as tannic acid, alum, or persulphate of iron, in a mild solution, should also be used. Should these fail, resort must then be had to the operation for removal of the prolapsed portion of the membrane. The methods of doing this (by excision and the thermo-cautery) have already been described.

It only remains for me to say that Winckel operates by clipping off the prolapsed portion of the membrane, and then stitching the internal edge of the membrane to the edge of the meatus with silver wire, allowing the sutures to remain in place for from five to seven days. If the operation is performed in this way the patient must be kept under observation, to see if contraction of the meatus takes place; and if it does, it should be treated by dilatation.

CHAPTER L.

ORGANIC DISEASES OF THE URETHRA (CONTINUED).

STRICTURE, FOREIGN BODIES, AND INCOMPLETE FISTULA.

8. **Stricture of the Urethra.**—Obstruction of the urethra, by narrowing of its caliber, is a much less common affection in the female than in the male; still it occurs sufficiently often to demand attention. There are some facts in the pathology of urethral stricture, peculiar to women, which I will first notice. Passing over congenital narrowing of the urethra, by simply saying that such a malformation has been seen, we find that stricture is developed in the female, as in the male, by the deposit of inflammatory products beneath the mucous membrane, which by gradual contraction constrict the canal. Ulceration of the membrane in a marked degree produces the same results. The inflammation and ulceration which end in the formation of stricture are usually specific in character; but the same may follow from the too free use of caustics, and injuries during childbirth. Stricture may also be produced by bands of scar tissue formed in the anterior vaginal wall and stretching across the urethra. Contraction of the whole canal occasionally occurs in cases of vesico-vaginal fistula of long standing. There the narrowing is simply the result of disuse. The form of stricture that will most frequently come under observation will be a contraction of the meatus urinarius, produced in many cases by the too liberal use of caustics in the treatment of abnormal growths at the lower end of the urethra, or from vulvitis. This form of stricture is the least troublesome, and is easily relieved. When due to the results of former urethritis or peri-urethritis, the walls of the urethra are thickened and indurated at the point of the stricture, and there is usually subacute urethritis, sometimes ulceration. In those cases where the caliber of the canal is diminished by cicatrices of the vaginal walls, and in general contraction of the urethra in vesico-

vaginal fistula of long standing, the mucous membrane may be perfectly normal.

Symptomatology.—Frequent and difficult urination are the chief troubles caused by stricture of the urethra. The stream becomes smaller, and may be twisted or flat, but this is rarely observed. Patients, as a rule, only notice that they require to urinate more frequently and that they have to make more voluntary efforts to empty the bladder than were necessary before. It will also be found in almost all cases of stricture, that the subject has at some previous time suffered an injury at childbirth, urethritis, or something to which the origin of the stricture can be traced. Great care should be taken to obtain the previous history of cases in which stricture is suspected. This will aid in settling the diagnosis and causation.

Diagnosis.—A digital examination by the vagina, will reveal thickening and induration, if the stricture is due to that cause. Cicatrices of the vaginal wall compressing the urethra can be detected in the same way. The use of the sound will aid in determining the location of the stricture and the extent to which the canal is contracted. When the stricture is at the meatus it can be found with facility, and the size of the opening can be measured with equal ease; but when it is located higher up, the largest sound that can be introduced without force should be passed up to the point of stricture. This will localize it; then, by using a sound that will pass through it, the extent of the constriction will be ascertained.

The affections which are liable to be mistaken for stricture are retention of urine or difficult urination from pressure on the urethra by the displaced gravid uterus, pelvic tumors, and dislocations of the urethra. The former can be excluded by a vaginal examination, and the latter can be detected by the sound, used as I directed while discussing the diagnosis of the dilatations.

Prognosis.—Stricture of the urethra usually yields very promptly to treatment so that the prognosis is good. The only exceptions are where the stricture has existed in a marked degree long enough to cause dilatation of the ureters and disease of the kidneys. Chronic cystitis or urethritis occurring as a result of the stricture, or coincident with it, may so complicate matters as to make recovery slow or even impossible. In cases where the whole urethra is contracted because of the existence of a vesico-vaginal fistula of long standing, there may be found extreme difficulty in restoring the tissues of the urethral walls to their normal state.

Treatment.—The treatment of stricture will depend upon its location and cause. If it is situated at the meatus, it can be divided by the urethrotome, or forcibly stretched with the dilator. When due to bands of scar tissue in the vagina, they should be divided at several points, and the urethra dilated by passing the sound. When it is owing to deposition of the products of inflammation in the submucous tissue, forcible and rapid dilatation, as practiced on the male subject, will answer well if the proper cases for this form of treatment are selected. While operating in this way the dilatation should be made carefully, with a view to breaking up the constricting tissue without lacerating the mucous membrane. To do this it is not necessary to dilate the urethra to any great extent. As soon as it is recognized that the stricture has given way, the dilatation should be suspended.

Incising the stricture from within outward, according to the method commended by Otis and others, for the cure of stricture in the male, will no doubt answer a good purpose. In fact, I am inclined to believe that this plan of treating the affection is the best; but my own experience with this operation on the female urethra is not sufficient to warrant my speaking positively.

In contraction of the whole urethra, arising from disuse in cases of vesico-vaginal fistula, gradual dilatation with graduated sounds answers very well. This should be attended to before closing the opening in the bladder. In all cases, attention should be given to any inflammation that may accompany the stricture or follow the treatment. It is well also to keep such patients under observation and pass the sound from time to time to see if there is any tendency for the stricture to return.

Stricture at the Junction of the Urethra and Bladder.—I desire to direct special attention to this form of stricture because it is, so far as I know, peculiar to women, and its influence on the function of the bladder has not been pointed out. In fact, no distinction has been made between the pathology or clinical history of stricture at the upper end of the urethra and elsewhere in the canal. At least, I am not aware that writers on this subject have mentioned this form of stricture. My own observations on this subject have been limited, but sufficient, I think, to warrant me in saying that stricture does occur at the junction of the bladder and urethra, and that it behaves differently from ordinary stricture at other parts of the canal.

From the study of the cases which have come under my notice, I have been led to the conclusion that stricture at this point may be produced by the causes which give rise to the same affection elsewhere. The upper portion of the urethra is liable to the same traumatic affections and inflammatory troubles as the rest of the urinary organs; and the same products or results of disease which cause stricture of the other portions of the urethra act just the same at the point in question. I need not, therefore, dwell on the anatomical lesions found in this affection. The point of most importance to which I desire to call particular attention is the fact that stricture at this part of the urethra will cause difficult urination, which is out of proportion to the extent of the narrowing of the canal. In other words, thickening of the tissues at the union of the urethra and bladder, with contraction of the canal in a slight degree, will cause great difficulty in urination, and frequently retention. This is contrary to the history of stricture of the urethra at other points. In such cases there is no retention of urine until the stricture closes the canal, or very nearly so; but I have seen retention in cases of stricture at the neck of the bladder while a medium-sized catheter could be passed with ease; thus showing that the narrowing of the canal was not the only cause of the deranged function. It would appear that the change in structure of the tissues prevented the normal action of that portion of the canal which performs the function of a sphincter vesicæ. In discussing the anatomy and function of the bladder and urethra, I stated that the process of closing and opening the neck of the bladder was not fully understood, and I must acknowledge a like difficulty in explaining the disturbance of function which is caused by partial stricture at this point. Spasmodic stricture suggests itself as the explanation of the symptoms presented in such cases; but it is excluded by demonstrating the presence of organic narrowing of the canal.

Symptomatology.—The symptoms presented in this form of stricture are difficult urination, and in some cases complete retention. I have also noticed in one case that there was a frequent desire to urinate; but that was accounted for by a slight catarrh of the bladder.

These symptoms are such as occur in other conditions, such as atrophy and paralysis of the bladder; obstruction of the urethra from tumors; calculi; or the pressure of the displaced uterus and prolapsus of the bladder. The affection can not, therefore, be detected from the phenomena presented.

Diagnosis.—In this form of stricture there is thickening and induration of the neck of the bladder, which may be detected by digital examination of the vagina. The sound will also reveal a narrowing of the canal at the vesical neck, but the contraction may not be marked. Main reliance must be placed upon the exclusion of all other conditions which can produce the same symptoms. Pressure upon the urethra and prolapsus of the bladder can be excluded by an examination of the pelvic organs; and the use of the sound will show anything like a complete obstruction of the canal.

Having cleared away the possible existence of either of these conditions, I come to the two affections which are most likely to be confounded with this form of stricture, viz., atrophy and paralysis of the bladder. To distinguish these from the stricture, the catheter should be passed when the bladder is well distended, and the character of the flow of urine watched, when it will be observed that in stricture the urine comes away with the usual force. The bladder contracts normally, and with its natural vigor, and expels the urine in a well-sustained stream through the catheter if there is stricture. On the other hand, in paralysis and atrophy, the stream is slow and without force, so much so that voluntary effort, or the pressure of the hand on the abdomen, is sometimes necessary to empty the bladder. This is especially so when the catheter is used while the patient is in the recumbent position. Finally, the diagnosis is confirmed by testing the dilatability of the urethra. This can be done by passing a dilator along the urethra, and gently testing the resistance of the walls of the canal. In this way a slight yielding can be observed at all points until the stricture is reached, and then decided resistance will be encountered. By careful attention to these points in the investigation, I believe it will be possible to make a diagnosis with reasonable certainty.

ILLUSTRATIVE CASES.

A lady, aged thirty-two; married fourteen years, and has had three children; the eldest twelve years and the youngest four years of age. Thirteen years ago she had typhoid fever, and during the fever had retention of urine, which necessitated the use of the catheter for about two weeks. After recovering, she was able to empty the bladder without difficulty, but she suffered from frequent and painful urination. After the birth of her second child, eight years ago, her bladder trouble became much worse, and she has been obliged to use the catheter almost daily ever since. When comparatively free from pelvic pain and tenderness (a relief that she seldom enjoys except for a few days at a time) she can empty the bladder by making strong voluntary efforts; but the rule is that she is obliged to use the catheter about every four or five hours. The bladder and urethra were, upon examination, found to be in their normal positions, but there were thickening and induration of the tissues at the union of the urethra and bladder. A No. 10 (Eng.) sound passed easily up to the neck of the bladder, where it was arrested. A No. 8 (Eng.) sound was then used, and it entered the bladder after encountering a little resistance at the point named. The catheter was then introduced, and the urine flowed freely and rapidly, the bladder contracting promptly and with its normal vigor. While the instrument was still in place, a vaginal examination by the finger was made, and the enlargement and induration of the urethral wall were distinctly felt. Dilatation of the urethra was then tried, and the canal yielded readily at all parts except at its extreme upper end, where it was found wanting in elasticity. There was slight catarrh of the bladder, as shown by an excess of mucus in the urine. The urethra was also congested. The patient was very weak, nervous, and dyspeptic. She was put upon a course of tonic treatment, and the canal slowly dilated by passing twice a week graduated conical sounds, each one being allowed to remain in place for five or ten minutes at a time. She improved, but when last seen she still had difficulty in passing urine.

Other cases might be given from my own records, but I prefer to present one, the history of which was given to me by Dr. Paul F. Mundé. I do not wish it to be understood that the only difficulty in the following case was stricture; I only desire to call attention to the fact that the patient had retention of urine and also stricture at the neck of the bladder. Still I am aware that the retention may have been due to some other cause—perhaps paralysis of the bladder. There are some points in the history of the case which do not pertain to the question now under discussion, but I will give the full record in the doctor's own words:

"Lizzie C., twenty-two years of age, single; admitted to the Woman's Hospital, December 27, 1876. Menstruated first at twelve. The menses since have been irregular, amount small, and always with pain in back and hypogastrium, through whole flow of two days. General health always good until she had a 'bilious attack' six years ago. Four years ago the flow became more and more scanty, and finally ceased entirely three years ago, since which time she has not menstruated at all. Four years ago, after a 'bilious attack,' she had retention of urine for three days, at which time the catheter was used. She had several attacks of retention thereafter, at intervals, then micturated naturally for one year, but for the past three years has not been able to empty her bladder without the aid of a catheter, which she introduces herself habitually three times in the twenty-four hours. She has no desire to micturate, and can hold her urine twenty-four hours without discomfort, save a slight sense of distention. She has leucorrhœa. Has slight menstrual molimina every four weeks, backache, hypogastric pain and soreness in breasts, constant pelvic weight and dragging. Bowels constipated. General health good. There is now frequent nausea.

"*Physical Examination.*—There is anteflexion; depth of the uterus, two and a half inches; both ovaries prolapsed and tender; right enlarged.

"*Treatment.*—Hot vaginal douche, strychnia, benzoic acid; later, daily washing out of the bladder with acidulated warm water (ac. muriat. dil., gtt. ij. to Oj). Urine contains a large quantity of mucus and triple phosphates. Washing out of bladder gives no relief. Phosphoric-acid mixture with ergot and iron was given for months with no benefit. Cups to lumbar region; galvanic current through pelvis twice a week.

"February 3, 1877.—Bladder washings omitted, as they caused pain. Large doses of ergot were given for two months (the strychnia being omitted after four months' trial), but without benefit. Faradic and galvanic current also used alternately every day for months without benefit. Discharged unimproved in any way, May 30, 1877.

"Readmitted, October, 1877. Condition the same.

"October 31.—Urethra dilated under ether; finger introduced into bladder, which was found flaccid, and did not contract on the finger, which, however, was so closely constricted at the sphincter vesicæ as to leave a circular ring on the finger, the distal portion of which appeared blue and almost numb on being withdrawn, after about five minutes. During the introduction of the finger the greatest amount of opposition felt was at the sphincter; therefore, the supposition was expressed that the retention might be due to spasmodic contraction of the sphincter (hysterical probably, connected with and dependent on the amenorrhœa, or deficient pelvic innervation), accompanied by atony of the detrusor from the same causes.

"On examining the pelvic cavity with the finger in the bladder, the left ovary was found normal in position, but smaller than it should be, being about the size of a shelled almond; the right, however, was distinctly felt as a globular body of the size of an English walnut. While practicing bimanual palpation on this ovary, it suddenly collapsed under the fingers and entirely disappeared, and could not be found on careful palpation. The explanation, doubtless, is that a cyst had been ruptured, and a partial cause at least for the amenorrhœa was thus discovered. Peritonitic symptoms were feared, and ice and opium given; but, save some suprapubic soreness, no inflammatory reaction followed. Retention persisted, and urine had to be drawn the afternoon of the dilatation.

"November 9.—Goodman's self-retaining catheter, with rubber tubing attached, was introduced for the purpose of allowing the urine to dribble off into a urinal, and thus give the bladder a chance to recover its tone. But the catheter caused so much pain that it had to be removed after several days.

"November 19.—Soft-rubber catheter was introduced, with tubing, etc., for like purpose, and is now retained and on trial. This also caused pain, and was removed. Subsequently vaginal cystotomy was performed by Dr. Emmet, but without avail; and the patient, after months of ineffectual treatment, was finally discharged uncured."

Treatment.—Regarding the management of stricture at the junction of the urethra and bladder, I am obliged to say that my experience has not yet been sufficient to enable me to speak definitely. It will be seen by the history of Dr. Mundé's case that rapid and free dilatation is not sufficient to effect a cure; at least, it did not relieve his patient. Division of the stricture by incision suggests itself, but I am confident that that operation would be unsatisfactory, because of the great irritation which always occurs when there is a solution of continuity at that point. My practice, therefore, has been to produce slow and gradual dilatation by the use of graduated sounds, and the application of oleate of mercury or iodine to the anterior vaginal wall at the site of the stricture. More extended observation may develop other and better methods of treatment, but for the present this is all that I have to offer on this subject.

9. **Foreign Bodies in the Urethra.**—Having treated at some length the subject of foreign bodies in the bladder, I shall confine myself here chiefly to the practical points relating to foreign bodies in the urethra. The character of the bodies and their classification are the same as those given while discussing foreign bodies in the bladder.

Symptomatology.—The chief symptom, if the body be of any size, is retention of urine. In some cases the obstruction is complete, in others the urine comes away in drops. In all cases there is pain and spasmodic action of both the bladder and urethra. If the body be rough or pointed, it will injure the urethral wall, and there will usually be hæmorrhage, and later, inflammation, possibly peri-urethral abscess. If not pointed, but hard and rough, it may ulcerate through the urethral wall, causing considerable hæmorrhage. When the obstruction is kept up for any length of time, the greatly distended bladder becomes very painful, and may be felt as a hard tumor above the pubes.

If obstruction occurring from this cause be neglected, such injuries of the bladder and kidneys as have already been described will ensue.

Diagnosis.—The pain and retention will lead to the examination of the urethra, first by catheter or sound, and then by the finger in the vagina. In this way the foreign body is readily detected, unless it be very soft, in which case it seldom produces retention, being usually washed out by the urine.

Treatment.—The foreign body being detected, its extraction should be attempted first by seizing it with a pair of long-bladed forceps, keeping it firmly in place by a finger pressed on the urethra through the vagina behind it. If this is not successful, an attempt may be made to hook it out with a wire loop.

I have seen calculi lodged in the urethra in two cases. The first one was detected by using the catheter to relieve the retention of urine, and the other was felt through the vaginal wall, while exploring with the finger to determine the cause of the pain in the urethra and the inability to pass water.

The first one, which was lodged near the meatus, was removed as follows: The forefinger of the left hand was introduced into the vagina and pressed above the calculus to steady it. A wire curette was then passed beyond the stone above, and by making traction with the curette and pressing with the finger from above downward, the body was extracted.

The other was lodged higher up in the urethra and was removed by the same method, except that I used the alligator forceps instead of the curette.

If it can not otherwise be reached the urethra may be dilated up to the point where the body is lodged, and then extracted. If extraction is impossible, there is a choice of cutting into the urethra and removing it, or of pushing it back into the bladder and then performing lithotripsy. To me the former seems preferable.

10. **Incomplete Internal Urethral Fistula.**—This is one of the rather rare affections, but it deserves a brief notice here, because little if anything, is said about it in the books, and it will be very likely met with at some time in the practice of every physician.

The pathology is pretty clearly indicated by the name. It is simply an opening in the urethra which leads into the walls of the urethro-vaginal septum, but does not open into the vagina. It is the result of some pre-existing trouble.

The causes which produced this affection in the cases which I have seen (I recall only two that have come under my notice) were, in the first, a peri-urethral inflammation which suppurated and discharged into the urethra, and in the second, a cyst which formed in the urethro-vaginal septum, which also opened into the urethra. In the first case, I suspect that the patient had gonorrhœa during pregnancy, and that after confinement an abscess formed in the anterior vaginal wall, and opened into the urethra as I have already stated. The walls of the abscess contracted, but instead of healing completely, there remained a sinus which communicated with the urethra. This much was inferred from the history obtained regarding its origin. When she was first seen, the fistulous opening was found in the floor of the urethra, and it led into the thickened and indurated septum between the urethra and vagina.

The other case was developed under my own observation in the following way. The lady was pregnant, and during pregnancy observed that there was some enlargement just within the introitus vaginæ. On examination, a cyst was found in the anterior vaginal wall at the middle of the urethra. She was at the eighth month of utero-gestation when this diagnosis was made, and I decided to let the matter rest until her confinement. Immediately after the birth of her child, inflammation was set up in the cyst, and suppuration followed. An opening was made into the cyst from the vagina, and pus was freely discharged. At the same time pus began to flow from the urethra. The discharge continued from both openings for some time, and then the vaginal opening closed, but pus continued to flow from the urethra for many weeks. A probe could be passed from the fistulous opening in the urethra into the sac, which slowly contracted, and finally, at the end of six months, closed entirely, and the patient completely recovered.

Symptomatology.—There is pain during urination, and heat and aching distress in the urethra; and if the opening is near to the neck of the bladder, frequent urination and vesical tenesmus. Pus is discharged from the urethra during urination, and is found in the urine. It also oozes away at all times. In some cases, the urine enters the fistula and causes smarting, burning pain during and for some time after urination, by distending the sac or burrowing in the tissues.

Diagnosis.—Examining the vagina by the finger will detect the thickening and induration of the walls of the urethra and vagina at the seat of the fistula; and by making pressure with the finger from above downward, pus and urine can be pressed out, and may be seen as they escape from the meatus urinarius. A small probe with a bulbous point should be bent, so as to make a short curve at the end, and then passed into the urethra with the curve directed toward the floor of the canal; and by moving it to and fro the fistula can usually be found. The point of the probe will catch in the opening, and when carried downward it can be felt through the wall of the vagina.

The only condition which is liable to be confounded with fistula is urethrocele, but by keeping in mind the physical signs of that affection the distinction will be recognized. Should there be any doubt, the endoscope should be used to examine the urethra. The fistula will then be found, and by using the speculum the opening can be probed through it. A flexible gum catheter may be used if the silver probe does not succeed.

Treatment.—The cases that have come under my care were treated by washing out the urethra with warm water and borax several times a day, and keeping the sac emptied as completely as possible by making pressure on the urethra, through the vagina, with the finger. Both cases were very tedious, and required much care and long treatment. This experience has satisfied me that the management of such cases ought to be altogether different from that which I employed. I am confident that better and more prompt results would be obtained by converting the incomplete into a complete fistula. This could be easily accomplished by passing a probe into the opening as far as possible, and then cutting down upon it through the wall of the vagina. By this operation a urethro-vaginal fistula is made, which by proper treatment will close of its own accord. During the after treatment the patient should wear a self-retaining catheter, or, what is still better, have the bladder emptied regularly by the catheter. This will keep the urine from getting into the fistula, which prevents healing. Care should be taken to keep the opening in the vagina from uniting before the urethral opening is healed. This can be accomplished by passing the probe into it from time to time. The whole fistula should be kept clean by injecting water into the urethra and letting it flow through the fistula into the vagina. In case the tissues are so indurated and changed in character as to refuse to heal under this treatment, the fistula must be closed by the usual operation. The method of operating is the same as in vesico-vaginal fistula, a description of which will be hereafter given.

CHAPTER LI.

DISEASES OF THE GLANDS OF THE FEMALE URETHRA.

The diseases of these glands to which I invite attention are:

1. Subacute inflammation or catarrh.
2. Gonorrhœal inflammation and its results or products.
3. Inflammation following vulvitis such as occurs in strumous children.
4. Tuberculosis.

1. **Catarrhal Inflammation.**—The first affection named in the classification is a mild form of inflammation which occurs in connection with subacute vaginitis, such as we find accompanying ordinary uterine disease, or following parturition. This condition gives the patient very little, if any, inconvenience, and readily passes unnoticed by the gynecologist unless specially looked for. The mouths of the ducts are slightly enlarged, and sometimes surrounded by a very narrow areola of a bright red color. By pressure upon the urethra from behind forward they discharge a white serous fluid. The cases which have come under my observation were detected while examining for other diseases, and none of them was attended with any marked symptoms. In some of them the inflammation disappeared without treatment. In others it continued without showing any tendency to increase in severity or lead to important changes of structure. It is quite possible that a non-specific vaginitis might induce a high grade of inflammation in these glands, with all the pathological changes to be described hereafter, but up to the present time I have not observed any evidence that such is the case.

2. **Gonorrhœal Inflammation.**—This is of the chronic purulent variety, and in time extends from the mucous membrane of the ducts to the surrounding tissues. It does not usually attract attention until the vaginitis and urethritis have subsided.

The lesions presented differ according to the length of time which the disease has existed. When examined early there is a slight swelling of the lower portion of the urethra. The mouths of the ducts are larger than normal, and the tissues around them are congested. There is tenderness to the touch, and pressure upon the urethra from above downward causes a free purulent discharge. Sometimes it is necessary to separate the labia of the meatus in order to see the orifices of the ducts. In cases of longer standing the mouths of the ducts are brought into view by a slight prolapsus and eversion of the mucous membrane caused by swelling. The mucous membrane in the neighborhood of the ducts becomes thickened by proliferation of the areolar tissue and epithelium, presenting an irregular papillomatous appearance of a deep-red color, upon the inner sides of which the orifices of the ducts appear like minute ulcers, of a yellowish gray color. The lower third of the urethra is generally thickened and indurated. The general appearance of the parts is quite like caruncle or papilloma of the meatus. In fact, inflammation of these glands has been mistaken for caruncle, at least it has been my misfortune in the past to confound the two affections, and I can not see how others could have made a differential diagnosis, if guided by the current literature upon the subject. In a large proportion of the cases of this disease I have observed that upon the inner sides of the labia minora, which rest upon the meatus, there are patches of inflammation which are caused and kept up by the purulent discharge from the glands. These circumscribed patches of inflammation sometimes extend downward on each side of the introitus, and occasionally involve the carunculæ myrtiformes. This gives rise to much tenderness, which simulates vaginismus. The chief symptoms are extreme tenderness to the touch, great discomfort in sitting and walking, occasional sharp stinging pain, and a continual sense of heat in the parts. There is painful urination in some cases, and in others there is not. In some of the most marked cases that I have seen, this symptom was entirely absent, while in less severe forms it has been present. That peculiar difference in the history of cases I have attributed to the fact that, in the well-developed forms of the disease there is a considerable eversion of the lower portion of the urethra, which throws the diseased and tender portion outward, and thereby prevents the urine from coming in contact with the irritable surfaces. Occasionally there is frequent urination, due probably to sympathetic irritation of the bladder. The symptom which is always present, in varying degrees of severity, is tenderness. The diagnosis and treatment may be left unnoticed until the other two affections of these glands have been described.

3. **Purulent Vulvitis.**—This occurs in children, especially those of a

scrofulous diathesis, and occasionally extends to the urethral glands. When such an extension of the disease occurs, it adds to its well-known rebelliousness to treatment. The original inflammation of the vulva may be relieved, but if the glands are involved, the purulent discharge from them will soon light up the disease of the external parts. From my own observations I believe that these glands rarely become involved; but when they do, there is little possibility of curing the affection of the vulva until the glands are first successfully treated. There is really nothing peculiar in the clinical history of this form of disease, except its etiology, and therefore I need not dwell longer upon it further than to say that I have seen a case of this kind, which had resisted treatment for a long time, but promptly recovered after the inflammation of the glands was detected and treated.

4. **Tuberculosis, or Tubercular Inflammation of the Urethral Glands.**—This is an affection to be distinguished from the other forms of the disease already considered. It occurs only in those who are of the tubercular diathesis, and may appear as a primary affection, or be developed during the progress of tubercular disease of other organs of the body. When the disease is first established, it presents the same pathological appearance as has been described under the head of gonorrhœal inflammation. There is, apparently, the same purulent discharge, with redness and proliferation around the mouths of the ducts, giving the peculiar caruncular or papillomatous appearance. The only peculiar characteristics of this affection that have been observed up to the present time, are the accumulation of caseous material in the tubules and ulceration, which occur in more advanced stages of the disease.

The ulceration takes place in the newly-formed tissue in the walls and around the mouths of the tubules. These caseous concretions and ulcerations are not found in all cases. Indeed, they are rare.

There is generally urethral inflammation accompanying this condition of the glands. It sometimes begins simultaneously with the disease of the glands, and when it does not it follows soon after. In time the bladder becomes affected, and also the kidneys. At whatever point the disease commences it increases in severity, and extends until the whole of the urinary organs are involved, unless the patient succumbs before it has completed its progress. In some cases there are polypi and papillary growths of small size found along the urethra. These, I believe, originate in inflammation of mucous follicles and papillæ of the mucous membrane.

The symptoms presented in this form of disease are the same as those found in the other forms already described. From this it will be observed that the physical appearance and the symptoms are insufficient to establish a diagnosis. When there are ulcerations and caseous deposits the disease may be strongly suspected of being tubercular. Still, there is room for doubt until we find tuberculosis of other organs. This either precedes or soon follows the appearance of the disease of the glands.

In all the cases which have come under my observation, the lungs were either tubercular when the patients were first seen or became so soon after.

This affection is a source of great annoyance and suffering, and no doubt hastens the progress of the pulmonary disease, with which it is generally accompanied. It has also another very important significance in the fact that it indicates the commencement of general tuberculosis of the urinary organs. The diagnosis of tubercular cystitis and urethritis has always been exceedingly difficult in the early stages of the disease. Indeed, it has been deemed impossible by most authors to distinguish ordinary cystitis from the tubercular form until the disease became developed in other organs of the body. Now the tuberculosis of these glands is understood, a valuable aid to diagnosis has been gained. Whenever an inflammation of these glands is found that can not be traced to a former gonorrhœa or vulvitis, it is almost sure to be tubercular, and the diagnosis is placed beyond doubt if the patient has the tubercular diathesis.

I am greatly indebted to Dr. Terrillon, of Paris, for some very valuable information upon the relations of disease of these glands to tuberculosis. In the "Progrés Médicale" he published a very elaborate article entitled "Polypoid Excrescences of the Female Urethra, Symptomatic of Tuberculosis of the Urinary Organs," which is full of original observations of inestimable value. In comparing his observations with my own, I am fully satisfied that he has mistaken tubercular inflammation, and the products of these glands, for excrescences, in some of his cases at least. Without being aware of the presence of these glands, it is perfectly natural that he should class those vascular developments found at the meatus urinarius among the ordinary neoplasms of the urethra, just as all others have done in the past. There is every reason for believing that the excrescences which Dr. Terrillon refers to differ in their essential pathology from the ordinary polypoid growths, usually called carunculæ, which are found in the urethra and are not associated with tuberculosis. And as the history of his cases coincides with the history of the cases of tuberculosis of these glands which I have seen, I am compelled to believe that he has not fully comprehended the true pathology of this affection. He has, however, clearly shown its relation to tuberculosis of the urinary organs, and that alone is worthy of the highest honor.

Dr. Terrillon's article is too long to be given in full, but a few condensed extracts will show his views upon the subject. His description of the symptoms and the general appearance of the parts affected is so complete that I will give it in his own words:

"The fungoid growths show themselves usually at the surface of the urethral orifice. They are projecting and pedunculate. Seldom isolated, they form most frequently a wreath more or less regular, around the orifice of the meatus. In very aggravated cases they are united into a mass, and then form a real projecting tumor with a fringed aspect, of a lively red. In the center of the tumor is easily to be found the orifice of the urethra masked by those papillary growths. The clinical history of fungoid excrescences of the urethra accompanying tuberculosis of that organ and the bladder includes the observation of two distinct parts: First, the study of the growths themselves and the character of them; second, all the phenomena to be found in cystitis and tubercular urethritis. Sometimes the symptoms of the two lesions are found together; sometimes on the contrary, they exist singly up to a certain period of the disease. One of the special symptoms of this affection is the exquisite tenderness of which these fungoids are possessed. The least touch, the least rubbing, the passage of urine, suffices to cause the most extensive pain, which renders life insupportable. This hyperæsthesia, which may extend to the neighboring parts, causes, at the sides of the orifice of the vulva, symptoms of the most acute vaginitis. These are the ordinary symptoms of fungoid growths when existing externally." The author at this point refers to excrescences found within the urethra as being of the same nature as those found at the meatus. He makes no distinction between the two forms of disease. There is, however, a difference worthy of notice. Excrescences found within the urethra are usually cystic polypi or enlarged papillæ of the mucous membrane, conditions which may exist independently of tuberculosis. I infer from some other statements made in his writings that the granular urethritis—as we are in the habit of calling it—is generally secondary to the disease of the urethral glands. The views of this author in regard to the order of development of urethritis, cystitis, and finally tuberculosis of the lungs, are set forth in the following:

"Sometimes at the time of their appearance these fungoids appear to be altogether isolated from all other serious lesions. Yet they seem to precede tuberculization, or soon take a rapid course in developing granulations in the urethra. In other cases these growths may appear some time after the symptoms of tuberculization have been established." The cases recorded by Dr. Terrillon, and also those which have come under my own observation, show that, as a rule, this disease of the urethra precedes the appearance of tuberculosis in other organs of the body, such as the lungs. It also is one of the first lesions observed in tuberculosis of the urinary organs. The following is from Dr. Terrillon's paper on this part of the subject:

"Now comes up the important question whether these polypi of the mucous membrane should be considered as a primary or an idiopathic lesion, and I think that it can be solved in the following manner: These polypi are most assuredly the result of chronic inflammation and an irritation of the mucous membrane. Now, development of tubercular granulations within the mucous membrane is at first the cause of irritation before any changes in the urine; ulceration does not occur until after a sufficient length of time. With one of our patients the first irritation induced the formation of polypi, and the common painful symptoms followed. Their extirpation gave relief, but that lasted only up to the time when urethro-vesical ulceration occurred. It will be observed that in this case the affection began in the urethra and extended to the bladder, and also secondarily involved the left kidney (ascending tuberculosis), causing, finally, change in the urine, with the free formation of pus. I therefore do not hesitate to maintain that the fungoid polypi are the result of tubercular irritation of the mucous membrane of the urethra, which gives rise to the very serious symptoms which occur in the early stages of the disease. Without them, urinary tuberculosis would not give rise to those striking symptoms until after a sufficient length of time, when the ulcerations appear in other organs. An analogous phenomenon which is observed in the larynx should be mentioned here. We know, as a matter of fact, that the tuberculization of the larynx does not only occasion ulceration, but also polypoid growths. There is produced at the expense of the ulcerated mucous membrane an hypertrophy and proliferation, in the form of cauliflower excrescences or cockscomb growths, a species of polypi, smaller or larger, by which the glottis might be more or less obliterated. It will, therefore, be admitted that there is a resemblance between laryngeal excrescences and those found in the urethra of women. The polypoid excrescences of the female urethra are shown, from an etiological point of view, to be of two distinct varieties. The first variety is idiopathic, and may be recognized by a slight irritation. The prognosis is good; extirpation in these cases gives a rapid cure. This is the most frequent variety. The second kind, although they give the same outward appearance as the first variety, are, on the contrary, accompanied from the outset by urethritis and tubercular cystitis, of which variety these lesions constitute important symptoms."

It is clearly evident to me that the two varieties described by Dr. Terrillon differ very essentially in their pathology. The first, or simpler forms correspond to the papilloma occasionally seen, and so easily cured by extirpation. The other variety has its origin in tubercular disease of the urethral glands, and is incurable by any treatment heretofore known, as the author states.

Dr. Terrillon gives the full history of four cases observed by him. They are original, and of great value, but too long to be produced here. Suffice it to say, that in all four there were present the excrescences at the meatus urinarius, due, as their clinical histories show, to disease of the glands, and, finally, tuberculosis of the urethra, bladder, and lungs. A careful post-mortem examination was made in the fourth case observed, which revealed tuberculosis of the urethra, bladder, right kidney, and lungs.

When I found inflammation of these glands associated with tuberculosis of other organs, it occurred to me that the disease of the glands might be of the same nature, or tubercular; but I am indebted to the writings of Dr. Terrillon for the full knowledge of the pathological relations of the affection of these glands to tuberculosis of the other urinary organs. We have studied the subject from different stand-points, and the combined results of our labors cover the ground pretty thoroughly. While he has clearly settled the relation of these excrescences to tuberculosis of the urinary organs, I have satisfied myself that these new growths are but the products of a tubercular inflammation of the urethral glands, the existence of which were, I presume, unknown to him. The treatment of the various forms of inflammation of these glands may all be discussed at the same time.

It is settled upon the best evidence that when these glands become inflamed there is no natural tendency to their recovery. Those who have read the history of my first published case will remember that I employed all the recognized treatment for caruncle, but at the end of a year my patient was no better. Dr. Terrillon has had a similar experience. On this point he says: "A characteristic more important, and to which I desire to call especial attention, because it indicates well, in my opinion, the consecutive development of these excrescences, is their tenacity and the facility with which they recur. Really, one can see in the observations" (meaning his cases) "in which continued surgical intervention has been practiced, it brought about either no relief or only a momentary amelioration."

The treatment which I employed at first was to inject the tubules with the ordinary solutions used in the treatment of inflammation of mucous membranes, using for the purpose a hypodermic syringe, with the point of the needle rounded off. This method I found useful but very tedious. It then occurred to me that laying open the tubules their whole length and keeping them open would prevent the purulent accumulation (which acts so effectually in keeping up the inflammation), and also bring the affected parts within easy reach of the necessary treatment. This method was suggested in my paper, published seven years ago, and since then I have tried the method in quite a number of cases, and found it entirely satisfactory. In the majority of cases it is all that is required to effect a complete cure. The method of operating is as follows: The patient is placed upon the left side, and a Sims's speculum used to keep the labia apart and retract the perinæum. This brings the parts well into view, and within easy reach of the operator.

The position and depth of the tubules having been first ascertained, the probe-pointed blade of a very fine scissors is then introduced, and the posterior wall divided its whole length. To prevent the parts from reuniting, a small piece of cotton, saturated with persulphate of iron, should be packed in between the divided edges. Brushing the surfaces over with the iron, without using the cotton, will answer, although less certainly, to prevent reuniting. Later still in my practice I have opened these ducts with the cautery. The method is as follows: A probe is passed into the ducts, and the wall to be divided is made tense by making pressure outward with the probe. The tissues are then divided. This method has the advantages of preventing hæmorrhage, and also of preventing the parts from reuniting. Very little after treatment is required. In the majority of cases recovery follows the operation of laying open the canals. Sometimes the inflammation lingers in a modified form, but yields to a few applications of nitrate of silver or sulphate of zinc. In several cases in which the excrescences were abundant, they remained after the operation, although very much reduced in size. An application of nitric acid destroyed them, and they have not shown the least disposition to return.

ILLUSTRATIVE CASES.

Gonorrhœal Inflammation.—The patient was a married lady, thirty years of age. She was well developed, and had always enjoyed good general health. With the exception of a mild form of dysmenorrhœa, she had had no disease of the sexual organs until one year before she came under my observation. At that time she was abruptly attacked with a profuse leucorrhœa and other symptoms of inflammation of the vulva and vagina, including painful urination. She placed herself at once under the care of the family physician, who treated her locally until she came to me. Her leucorrhœa had by that time diminished, and the painful urination had passed away, but otherwise she had not improved. At my first examination I found traces of the former inflammation of the vulva and vagina. The meatus urinarius was everted and surrounded by a number of papillary projections, of a deep-red color, and altogether presenting an appearance resembling that which is known as vascular tumor, or carbuncle of the meatus. See Fig. 282, Plate IV.

The diagnosis then made was subacute vaginitis, perhaps of gonorrhœal origin, and inflamed papilloma of the meatus urinarius. The vaginitis was treated in the usual way, and soon terminated in complete recovery, but the inflammation and tenderness of the meatus remained unchanged, and annoyed the patient exceedingly. She could not walk or sit without pain, and coitus had to be avoided entirely.

I presumed at first that the disease of the meatus was kept up by the irritating discharge from the vagina, and I hoped that when the one was removed the other would get well, but such was not the case. I then thoroughly cauterized the elevated and tender points about the meatus with nitrate of silver. This caused very great pain at the time, and was followed by no improvement. Pure nitric acid was used in the same way, but with no better result except to destroy elevations of the mucous membrane around the orifice. The same areola of inflammation around the meatus continued, and the symptoms remained the same. A full account of the progress of the case would be tedious and useless. Suffice it to say that for eight months I treated the disease with diligence and care, but at the end of that time she was very little better.

Caustics and cauteries being unsatisfactory, I tried sedatives and alteratives, including iodoform, iodine, mercury, and bismuth. At times the inflammation subsided slightly, and the elevated points became smaller, but in a short time fresh proliferations sprang up and the muco-purulent secretion continued to bathe the parts. Toward the end of this long period of treatment, and while making a critical examination, I observed that on each side of the meatus there were two depressions filled with a yellowish gray matter, looking like minute ulcers, but upon probing them, with a view to determine their depth, I found that they admitted the probe over half an inch. After withdrawing the probe, I made pressure upon the urethra from above downward, and succeeded in expressing a purulent fluid, which could be distinctly seen escaping from their orifices. Treatment was then directed to these canals; first, they were injected with tincture of iodine, and subsequently they were cauterized by passing a probe coated with nitrate of silver along their entire depth. Prompt improvement followed this application. The inflammation around the meatus gradually subsided, and the pain and tenderness passed away. In less than two months from the time that a correct diagnosis was made and appropriate treatment employed the patient recovered completely. The satisfaction which this gave to both patient and physician will be appreciated when the fact is recalled that she had been suffering for twenty-one months, and that for nine months she had been under my treatment without any marked improvement.

Such was my experience with this disease before I knew anything about the presence and character of the structures involved. Since then I have seen several cases of the same kind, and have found the diagnosis easy and the treatment satisfactory. A brief history of another case will contrast agreeably with the former one:

A delicate nervous lady, aged thirty-three years, married seven years without having had children. She had suffered for one year from symptoms resembling those of the case given above. At first her sufferings were not so severe, but in time they became intolerable, and she was compelled to consult her physician, who examined her, and found what he supposed to be a vascular tumor of the meatus urinarius. He sent her to me to have it removed, I found that she had the disease now under consideration, and a subacute vaginitis limited mostly to the upper and posterior portion of the vagina. The inflamed papillæ around the mouths of the ducts were deep red, and so tender as to render it very difficult to examine her. She was directed to use a vaginal douche of borax and warm water. The inflamed papillæ were touched with equal parts of tincture of iodine and carbolic acid, and the ducts were injected with a solution of ʒ ii of nitrate of silver to ℥ i of water. Twice a week subsequently they were injected with a solution of two grains of nitrate of silver to the ounce of water, and finally borax and water were used. Under that treatment she recovered in six weeks.

For injecting these ducts, I use a hypodermic syringe with the needle made probe pointed.

The history of these two cases may possibly convey the impression that inflammation of these glands is easily cured. That is only true in some cases; I have seen others that were exceedingly obstinate. The disease would subside, but not fully disappear, and as soon as all applications were suspended would return.

This has led me to think that other methods of treatment may yet be discovered, and has induced me to lay open the ducts of these glands in the way already described.

Tuberculosis of the Urethral Glands.—The first case of this kind which I remember having seen came under the care of Prof. E. N. Chapman at the Long Island College Hospital while I was his assistant. She presented at her first visit the history and physical signs of what was then supposed to be caruncle, which was treated with caustics. Very little relief followed. She soon gave evidence of cystitis which was also treated for several months without success. The diagnosis was inflammation of the bladder. After a time she disappeared, but I subsequently learned that she died in the City Hospital, of pulmonary tuberculosis. Upon reflection I am satisfied that the primary disease was tuberculosis of the urethral glands.

The next case came under my own care in the Long Island College Hospital. When first seen she had papillomatous excrescences at the meatus and cystitis, presumed to be non-specific. I was at that time unaware of the presence of the urethral glands, and therefore did not at first suspect tuberculosis. Treatment gave her no relief, and her sufferings were beyond description. In the hope of curing her, I made an artificial vesico-vaginal fistula, which relieved her very much, but her general condition became more and more like that of a consumptive. She died, and a post-mortem examination revealed complete destruction of the left kidney from tuberculosis. The bladder and urethra were covered throughout with tubercular ulcerations. Since I discovered the urethral glands I have seen two cases of tuberculosis affecting them. The history of one of them is as follows:

A young single lady first consulted me for dysmenorrhœa and frequent and painful urination. I found by examination that she had anteflexion of the uterus and inflammation of the urethral glands. The painful menstruation was partially relieved by correcting the flexion. The inflamed glands were treated in the manner to be hereafter described, and the inflammation at that point disappeared. Her frequent urination did not subside, however; on the contrary, she developed a marked cystitis, which did not yield to treatment. Her lungs at the same time gave evidence of tuberculosis, which proved fatal.

Recurring Gonorrhœa from Gonorrhœal Inflammation of the Urethral Glands.—Dr. H. C. Howard, of Campaign, Illinois, has recently had a series of cases in which gonorrhœa had been communicated by the husband to the wife, and cured in both, but repeatedly returned in the case of the husband, although he had not been improperly exposed. Careful examination of the wife showed that the disease had persisted in the little glands of the female urethra, first described by Dr. A. J. C. Skene, of Brooklyn ("American Journal of Obstetrics," April, 1880), and fully noticed editorially in the "Chicago Medical Gazette," May 5, 1880. Dr. Howard, believing that these little glands were continuing to pour out true gonorrhœal pus, although the patient presented no other evidence of the disease, and that this pus had produced recurrent gonorrhœa in the male, directed his treatment to them, which consisted in the application of carbolic-acid crystals. In each case the discharge disappeared permanently under this treatment, and the disease in the male now having been cured, did not return. Dr. Skene in his original paper, expresses the opinion that in the case which he had observed, the inflammation was caused by gonorrhœa, which persisted in the glands long after the original trace of the disease had disappeared. Dr. Howard seems to have been the first to note this condition as a cause of gonorrhœa recurring as often as cured in the male. His observation is important as showing that the female may communicate the disease long after it would previously have been pronounced cured.—*Chicago Medical Review, August 5.*

After reading the account of Dr. Howard's cases I gave attention to the subject and found cases to correspond with his.

The following is a fair example and has additional value because confirmed by another observer.

A widow who had children and was perfectly well, contracted a gonorrhœa which was supposed to be cured. She married again and her husband developed a gonorrhœa which he supposed was a recurrence of the disease, having had it before. He was led to this conclusion because his wife had no evidence of being similarly affected. He was treated by Prof. Charles Jewett and soon recovered, but again and again the disease returned. Dr. Jewett suspected that his wife might have gonorrhœa without the usual acute symptoms. He sent her to me for examination. I could not find the slightest evidence of any disease of the urethra, vagina, or uterus, but I noticed that the orifices of the urethral glands were rather deeper in color than normal. To make sure I laid the ducts open, and found pus in both of them. They were thoroughly cauterized with carbolic acid and tincture of iodine. From that day till the present time, now four years, there has been no further evidence of gonorrhœa in that family.

CHAPTER LII.

VESICAL AND URETHRAL FISTULÆ.

Classification and Pathology.—The classification of fistulæ which I shall adopt is as follows:

I. VESICO-VAGINAL.—This is subdivided into (*a*) those occurring in the trigone, the opening being situated at the neck of the bladder; (*b*) those occurring at the bas-fond, the opening involving the inferior portion of the bladder.

II. URETHRO-VAGINAL.—The opening being between the urethra and vagina.

III. UTERO-VAGINAL.—The opening communicating with the bladder, vagina, and cervix, or with the body of the uterus.

IV. In this variety the entire vesico-vaginal wall is destroyed, and sometimes the urethro-vaginal wall also. This variety is fortunately quite rare.

The relative frequency of these varieties is about in the order in which they are given in the classification. The last and rarest one is attended with extensive destruction of tissue, and includes the first three classes. In fact, it covers the ground occupied by all the other varieties.

The direction of these fistulæ may be transverse, oblique, or longitudinal, and their form may be oval, round, linear, angular, or irregular. The dimensions of the opening also vary from one so small as barely to admit an ordinary probe to one measuring two inches in diameter. The direction of the fistula may possibly be determined by the cause of the primary injury.

The form of the opening depends upon the arrangement of the muscular fibers of the vagina. This influences the line of laceration, and also the healing process, which latter modifies the final shape of the opening.

The condition of the borders of the fistulæ and their form differ much at first; sometimes they are thin, inverted, quite pale, and smooth; this is especially the case with the upper border. In other instances they are thick, soft, and muscular, or, again, they may be hard, inelastic, and anæmic. The mucous membrane of the bladder often projects through the opening if it is large, forming a red erectile tumor.

Symptomatology.—The chief symptom is incontinence of urine. This is always the same, no matter how small or how large the opening may be. In some cases, indeed, this is the only symptom. In others there is much pain in the pelvic region, and irritation from the constant flow of urine, the pelvic pain being most marked at first, and in those cases in which there is much scar tissue.

Sometimes there is inflammation of the bladder and urethra, which causes pain.

If the fistula is due to parturition, the state of the bladder immediately succeeding the labor is such that for two or three days there is an inability to evacuate its contents without some pain or uneasiness, requiring perhaps the use of the catheter. After this the urine may escape through the urethra, or it may do so from the very beginning.

In from five to ten days after confinement the urine begins to escape entirely from the vagina. A sense of something giving way is sometimes felt at that time.

The labia, the inner surface of the thighs, and the perinæum, being constantly bathed in the urine, become red, inflamed, and covered with pustules, which sometimes form ulcers of considerable depth. The external genitalia and the surface of the vagina frequently become incrusted with a saline deposit consisting of urates, and there is also a strong urinous odor about the person and the clothing of the patient.

These symptoms and physical signs, while they are strong evidences of fistula, are not sufficient to base a diagnosis upon. A physical exploration of the parts must be made to ascertain with certainty the presence or absence of a fistula.

Physical Signs.—The patient should be placed upon a table in Sims's position in a good light, Sims's speculum should be used to open the vagina, and the perinæum should be drawn well back toward the sacrum until the entrance of the air distends the vaginal cavity.

The fistula, if one exists, will most likely be at once detected, unless it is very small. If it is not found in this way, a probe should be used to explore any pockets or depressions that may exist in the vaginal wall. Should this fail, milk may be injected through the urethra into the bladder to distend its walls, and special attention given to see if any of it passes into the vagina.

Incontinence from some muscular lesion of the neck of the bladder, which allows the urine to find its way back into the vagina after escaping passively from the urethra, is the only affection which simulates fistula, but a careful examination made in the manner just described will determine the diagnosis.

Complications.—These are stricture of the vagina, recto-vaginal fistula, obliteration of the urethra, and cicatrices of the vagina and cervix uteri. Inflammation of the edges of the fistula and deposits of urinary salts in the vagina may be present; cystitis, vaginitis, and urethritis may also be found accompanying the fistulæ.

Prognosis.—If the fistula is of such a nature that it can be closed by an operation with any reasonable hope of success, and in the great majority of cases this is possible, the chances of a perfect recovery are excellent.

Good operating will generally insure success, except in extraordinary cases, and these are very rare.

Causation.—Pressure of the fœtal head is the most common cause of vesico-vaginal fistula. Almost all authors agree in attributing about ninety per cent to this cause.

Compression of the soft parts in tedious labor causes death and sloughing of these tissues, and the edges of the opening thus made failing to unite, the fistulous opening results. If the vitality of the parts is not completely destroyed, but is greatly diminished, inflammation and ulceration may occur, and lead to the same result as in the case of sloughing. The best evidence that pressure of the fœtal head in delayed labor is the chief cause of fistula is obtained from the fact that since the progress and improvement in the obstetric art, by which difficult labors are more promptly terminated, fistula is far less frequent than formerly.

Wounds of the vesico-vaginal wall may occur during the use of instruments or long-continued efforts in manual delivery. The slipping of a perforator in cases of craniotomy may be especially mentioned as likely to open the vesico-vaginal septum.

The forceps have come in for a large share of blame in times past, but they have little agency in producing such an accident; the earlier and the more frequent that they are employed by educated hands, the fewer fistulæ will occur. This is a fact obtained from the records of obstetrics and gynecology.

Foreign substances in the bladder—vesical calculi, for example—may cause fistula by perforating the vesico-vaginal septum. Many years ago I saw a case, with Dr. J. H. Hobart Burge, of Brooklyn, in which this happened. The first calculus formed in the bladder was discharged through the vesico-vaginal septum, and several more were discharged through the fistula. Badly fitting pessaries, worn for too great a length of time, may also be mentioned among the causes inducing this lesion. Then there are a number of cases recorded in which a pessary has destroyed the vesico-vaginal septum. The process by which the opening is made is no doubt ulceration from pressure and irritation. The process of ulceration is probably favored by the deposit on the instrument of the salts of the urine, and the irregularities of this deposit produce destruction of tissue. There is no doubt that this accident happened more frequently in past times when the material used for pessaries was unsuitable, and the methods of adapting them were not so well understood as they are now.

The vesico-vaginal septum is often destroyed by malignant disease in the advanced stages, but this does not belong to the subject on hand, and will not be discussed here.

Treatment.—The treatment of fistula is either palliative or curative by surgical means.

Palliative treatment is little more than an attempt to make the patient comfortable by protecting her from irritation and filth consequent upon the constant flow of urine.

The curative treatment includes the preparation of the patient, the operation, and the subsequent management.

Preparatory Treatment.—The operation for the cure of fistula should not be done until after the lapse of at least three months from the date of its occurrence. Some have operated earlier with success, but these early operations can not be expected to result successfully. It requires at least three months before the system has completely recovered from the influence of gestation and parturition, and complete involution of the sexual organs is secured.

In case of fistula the process of involution is apt to be delayed from the local irritation and general depression which usually attend such injuries. If the patient is feeble, with loss of appetite, and is nervous, months of preparatory treatment may be necessary, consisting of good diet, fresh air, attention to the intestinal and other secretions, with the use of tonics.

It is certain that no one familiar with the treatment of this form of fistula will be rash enough to subject his patient to the inconvenience of such an operation before attending to these preliminary measures. There is no operation in surgery which depends more for its success on good general health than this one. As regards the local treatment, all inflammation must have subsided, and good general nutrition of the tissues about the fistula should be secured in order to give a fair chance to obtain union after the operation. To secure all this, due attention to cleanliness should be given and the vaginal douche of hot water frequently employed. The excoriation due to the urine flowing over the parts can be relieved by Lister's ointment of boracic acid. The saline incrustations which form on the edges of the fistula and other parts can be removed with the forceps, and their reformation can be checked by tonics, the mineral acids being specially indicated.

About one week after menstruation has ceased is the best period to operate. If it is delayed until near a menstrual period the anæsthetic which must be given and the irritation produced by the operation itself are liable to induce premature menstruation. Besides, the tissues are in the best condition to undergo the healing process at that time.

The complication most commonly met with is stricture of the vagina and scar tissue at the edges of the fistula. No operation should be undertaken until these are disposed of as far as possible. The methods of relieving stricture of the vagina, and also of treating scar tissue, are by dividing the cicatricial bands and dilating.

For a fuller discussion of this subject the reader is referred to the section of this work on cicatrices of the cervix uteri and vagina.

It may be remarked that in cases where the scar tissue can not be removed entirely, the best results are obtained by dilatation with the tampon.

OPERATION FOR THE CURE OF FISTULÆ.

An exceedingly interesting chapter might be written on the many methods suggested and practiced to close vesico-vaginal fistula but, while interesting, it would not be sufficiently profitable to occupy time in this connection. It may be briefly, yet comprehensively, stated that all operations and all methods of treatment tried were failures until Dr. J. Marion Sims by his genius solved the problem. Furthermore, it may be stated that all modifications of Sims's method suggested and practiced by others have not been improvements worthy of notice. A very few changes of a trivial character have been made which simplify some of the details of the operation, but beyond this the operation in principle and practice remains the same as when given to the profession by Dr. Sims, to whom the world is indebted for this grand triumph of surgical science and art. In describing the operation I shall first give Sims's method as closely as I can, and then note such slight changes as have been made by other operators. I will be permitted to state here that before undertaking this important operation the surgeon should have acquired facility in the practice of Sims's methods of operating upon the cervix uteri and vagina. The placing of the patient in the proper position, the management of Sims's speculum when held by an assistant, and the use of gynecological instruments should all be familiar to the operator. The success of the operation involves so much to the patient, that all reasonable efforts should be made to secure success, and perfect operating is the first essential to that success.

The treatment is divided into four parts: first, the placing the patient in the proper position and in a good light; second, the paring the edges of the fistula; third, the introduction of the sutures and tying them; and fourth, the after management. The first procedure is presumed to be familiar to the reader, but if not, reference should be made to the chapter in which a detailed account of Sims's position is given and also the management of Sims's speculum. The operation is naturally divided into two parts—first, paring the edges of the fistula, second, passing the sutures and tying them.

The patient having been placed in Sims's position upon the operating table, and Sims's speculum having been introduced, one assistant holds the speculum while another does the sponging and assists with the instruments and sutures. A thoroughly competent physician should be secured to give the anæsthetic. Very much depends upon the patient being kept perfectly quiet, and still free from the dangers of a too profound anæsthesia.

Paring the Edges of the Fistula.—The lower edge of the fistula is seized with a Sims's tenaculum (Fig. 283), or a tissue forceps (Fig. 74), according to the preference of the operator. Then with a curved scissors (Fig. 75) a strip is removed all around the fistula, extending from the mucous membrane of the bladder out upon the vaginal membrane at least three eighths of an inch (Fig. 284). Care should be taken not to wound the mucous membrane of the bladder. It is better to keep unbroken the piece that is removed, if possible. If upon careful inspection there is any portion of the vivified surface that is not completely and uniformly pared, it should be trimmed until a perfectly smooth and beveled surface is obtained. Fig. 284 shows

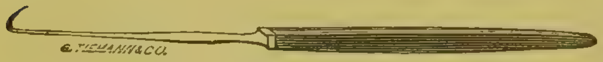

FIG. 283.—Sims's tenaculum.

the beveling of the vivified edges of the fistula. The paring should be done with a view also of making the edges of the fistula, when brought together, form a straight or slightly curved line. The direction of the line of coaptation will of necessity depend upon the size and long diameter of the fistula. When it is possible, I prefer to make this line correspond with the long diameter of the vagina, but in case the long diameter of the fistula is at right angles to the axis of the vagina, the edges must be brought together in that position. While the surgeon is paring the edges the assistant sponges the wound with sponges held in Sims's long-handled sponge-holders (Fig. 285).

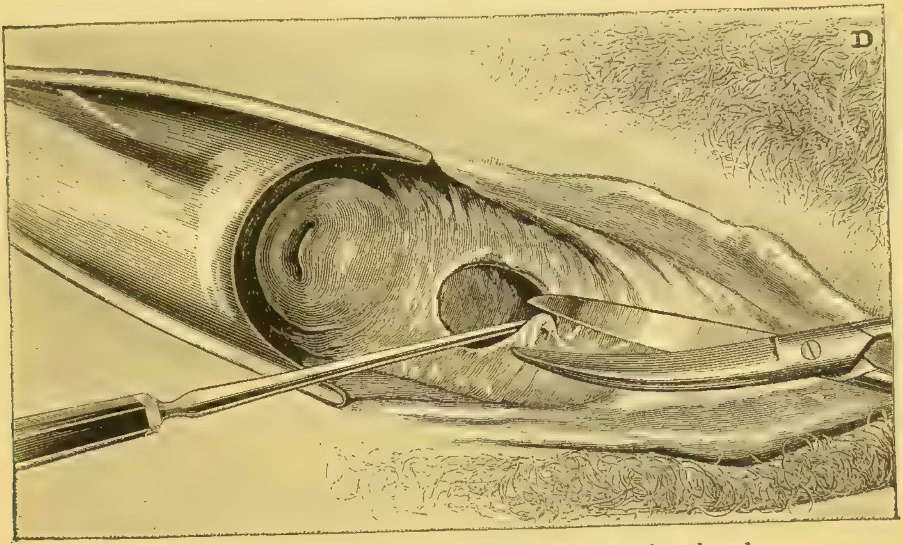

Fig. 284.—Operation for vesico-vaginal fistula: paring the edges.

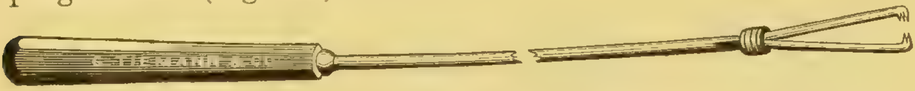

Fig 285.—Sims's sponge-holder.

When the scissors are used to do the paring there is not much hæmorrhage. Occasionally there is troublesome bleeding which requires to be arrested by hot water either injected or applied with sponges. This will arrest all troublesome oozing, and if any vessel is found that persists in bleeding it can be closed by passing a catgut or silk suture under it from the vaginal surface some distance from the vivified edge.

Introduction of the Sutures.—Dr. Sims employed silver-wire sutures in this operation, and by this he secured one great element of success. At the time that he introduced this metallic suture it was the only one that was aseptic and without irritating qualities, both of which were absolutely necessary to secure union in the operation. Since that time a better knowledge of all that pertains to aseptic and antiseptic surgery has made it practicable to render silk as reliable as the silver wire. I have fully discussed this subject in the preceding pages, so that I need only say here that I use the silk in this operation. Long before I had given up silver-wire sutures, Simon, of Germany, had employed silk in operating for vesico-vaginal fistula, and with success. This fact, and my own experience, which has been just as favorable as when I used wire sutures, lead me to believe that silk will be the suture of the future, and hence I will discuss the exclusive use of it in this operation. That the silk is as successful as silver wire I have proved to my own satisfaction in many cases, and it is much more easily managed both in the introduction, tying, and removal. No. 5 braided silk, or No. 3, if the walls of the septum are thin, prepared as heretofore directed, is used with Emmet's needle. The length of the needle varies according to the thickness of the tissues to be sutured and the fancy of the operator. The needle is grasped in the forceps (Fig. 82) so that the two are at right angles, if the line of coaptation is parallel to the axis of the vagina, but if the line runs across the vagina, the needle and forceps are arranged in a line. The tissues are held with a tenaculum, and the first suture is introduced at the angle farthest from the operator. The needle is carried through one side, and when its point emerges it is caught with Emmet's counter-pressure instrument (Fig. 119). The first suture is then held by the assistant who holds the speculum, and this fixes the edges so that the other sutures can be passed with more facility. Fig. 288 shows the first sutures tied, and the others introduced. The majority of surgeons introduce the suture about half an inch from the incision on the vaginal side, and at the edge of the mucous membrane of the bladder. I much prefer to pass the suture in a curved line from

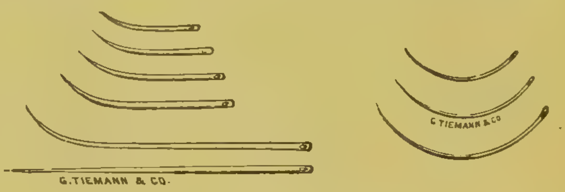

FIG. 286.—Emmet's needles.

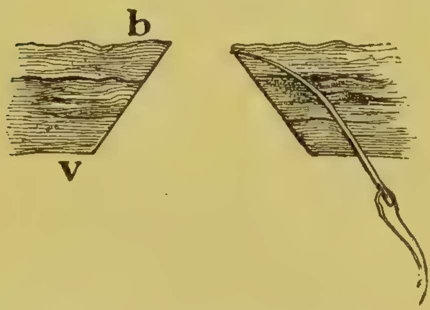

FIG. 287.—The curved track of the needle; b, bladder surface; v, vaginal surface.

one edge to the other of the vivified surface (Fig. 287). If I find that this does not draw the surfaces together with facility, I pass half of the sutures a quarter of an inch back from the incised surfaces, and then introduce superficial sutures between them to keep the edges from curving inward when the sutures are tied.

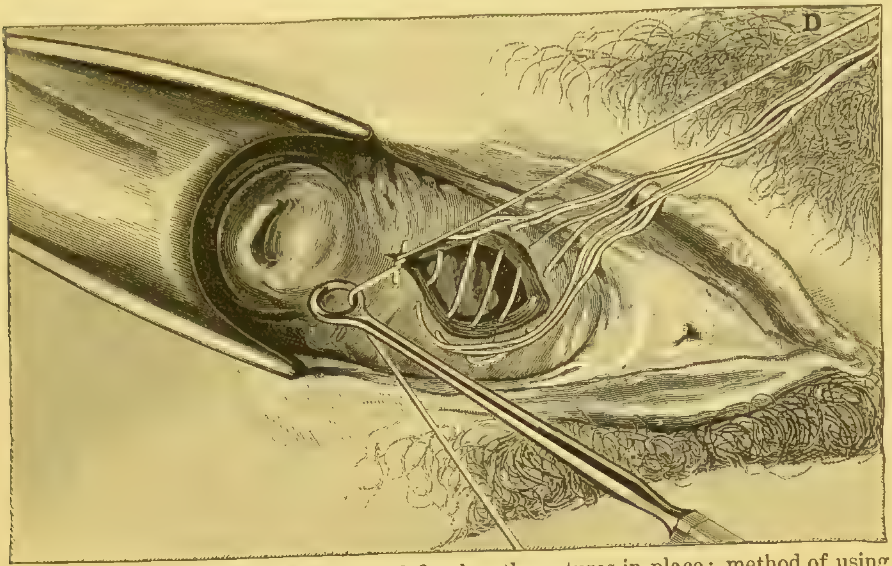

Fig. 288.—Operation for vesico-vaginal fistula: the sutures in place: method of using the counter-pressure instrument in tying the sutures.

The method of introducing sutures was fully described and illustrated in the chapter on injuries of the pelvic floor, but so much depends upon the accuracy with which this is accomplished that I refer to it again.

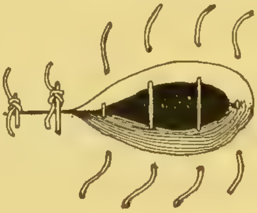

Fig. 289.—Two sutures tied.

The great point is to make the needle grasp more tissue in the central portion of the vivified surface than at the edges, so that when the suture is tightened the opposing surfaces will make two straight lines in place of two concaves, as would be the case if the needle was passed straight through the tissues. One can tell how the sutures will tie by observing how the free surface appears when the needle is in place. When the needle is introduced completely, the tissues resting upon the needle should give a convex surface.

The number of sutures to be used should be sufficient to bring the edges accurately together. This requires that they should be about three sixteenths of an inch apart, if No. 3 silk is used. Having introduced all the sutures, the bladder should be thoroughly washed out, in order to free it from all blood that may have accumulated in it. Special care should be taken to make sure that no blood-clot is left in the bladder. The sutures should then be tied in the same manner as has already been described in the directions for restoring the cervix uteri after laceration.

After Treatment.—The after treatment is very simple indeed, as I now conduct it. The patient is placed in bed, and, if there is pain of a severe nature, opium is given to relieve it. This is very seldom necessary, the pain being very slight, as a rule. During the first twenty-four hours the catheter is passed every four or six hours, and oftener if the patient has a desire to urinate; after that, she is allowed to urinate when she desires to do so. If there is vomiting after the anæsthetic, sips of hot water are given. The tampon is removed on the second day, and the bowels are moved by enema on the third day. I keep the patient in bed, but, after the first twenty-four hours, she is permitted to change her position whenever that is necessary to secure her comfort, but she is not permitted to leave the recumbent position. On the eighth day the sutures are removed, and, if the result is perfect, the patient is permitted to gradually resume her usual duties. In some cases there is a slight cystitis, indicated by the presence of mucus in the urine and frequent urination. This should be managed by washing the bladder as directed under the head of the treatment of cystitis.

The after treatment described above is nearly the same as that practiced by Simon, and I am satisfied that it gives as good results as any. It has also some great advantages. The patient escapes the great discomfort of wearing the catheter and remaining absolutely in one position, as she must do if the catheter is retained. There is also much less danger of cystitis or calculus if the catheter is not retained. Should any one feel disposed to use the catheter, I may say that Sims's new style, as figured on page 251 of Thomas's work on "Diseases of Women," is the best in general use. I have also employed a soft-rubber catheter, which is very comfortable. It is retained in the bladder by passing around it a piece of adhesive plaster, to which silk threads are attached and fastened to a strap carried around the waist.

ILLUSTRATIVE CASES.

The Simplest Form of Vesico-Vaginal Fistula.—In the winter of 1886 my associate, Prof. Nilsen, brought a patient to my clinic, at the New York Post-Graduate School, who had a bilateral laceration of the cervix uteri and a vesico-vaginal fistula a quarter of an inch in diameter, located in the median line midway between the neck of the bladder and the cervix uteri. These injuries resulted from her last confinement, which was a very tedious one. The tissues around the fistula were in a perfectly healthy condition. A tenaculum was passed through both edges of the fistula exactly in its center, care being taken not to include the mucous membrane of the bladder in the grasp of the instrument. Traction was then made with the tenaculum, which raised a cone-shaped projection in the vagina, the fistula being in the apex of the cone. While the parts were held in this position, the edges were pared with one clip of the curved scissors. The piece of tissue removed was oblong, with the fistulous opening in its center. The wound left was more than an inch long, and nearly three quarters of an inch wide on the vaginal side, while the opening in the mucous membrane of the bladder was not much larger than before. At the upper and lower angles of the wound, a little more tissue in the vaginal wall was removed with the tenaculum and scissors, and that completed the vivifying. Seven prepared silk sutures were introduced and tied, the bladder being first washed out, and the operation was completed.

The lacerated cervix was then restored in the usual way. The two operations occupied less than an hour. The patient was then put to bed, and she rested fairly well during the night. About five hours after the operation, which was performed between eight and nine o'clock in the evening, the patient expressed a desire to urinate, and the nurse passed the catheter. After this the patient passed urine about every five hours for the first three days and nights, and subsequently at longer intervals.

There was no other treatment except that the patient was kept in the recumbent position. At my next clinic, one week afterward, Prof. Nilsen removed the sutures from the fistula and cervix, and found the result perfect in both operations. When the sutures were removed there was scarcely a trace of the point of union where the fistula had been.

Fistula complicated with Laceration of the Anterior Wall of the Cervix Uteri. (By T. A. Emmet, M. D.)—Ann Murphy, a native of Ireland, aged forty-one, was admitted to the hospital, October 5, 1864, from the city.

In May, 1857, she had been discharged cured from the hospital after an operation by Dr. Sims for the relief of a utero-vesico-vaginal fistula resulting from a laceration directly through the anterior lip into the base of the bladder. Nine months after her discharge, she had a miscarriage at the third month, and a year afterward another at two months.

In her second pregnancy, at full term, labor commenced by a sudden rupture of the membranes on Tuesday evening, December, 1861. Until 9 P. M. of the Thursday following the pains were slight and irregular. Labor then came on regularly, and within an hour afterward she was delivered naturally of a still-born infant, of the average size, with the feet presenting. The urine began to escape involuntarily after delivery. No slough was passed, and she recovered as from a natural labor.

Pathological Condition.—Laceration had again taken place along the line of the previous operation, through the anterior lip, directly in the median line. The fissure through the cervix had, however, closed nearly to the uterine canal, leaving a small fistula in the base of the bladder a few lines in front of the neck.

October 5th.—The opening being so small, little more than its edges were denuded, and the raw surfaces were brought together with three sutures. On removing these an opening of about the same size was found near the cervix, leading forward into the fistula. In closing the fistula, a portion of the vaginal surface around the opening had been scarified, as well as its edges, for the purpose of increasing the breadth of surface brought together. As the operation was so simple, either care had not been taken to pass a sufficient number of sutures to obliterate entirely the fold formed just in front of the cervix, on doubling the surfaces together, or else the sutures at this point had been twisted too tight, so as to cut out from below upward.

October 30th.—For some distance around the opening the tissue was excavated with a pair of scissors, so that the surface was made to slope inward to the opening of the fistula in the bladder. The rest of the fistulous edge was then removed, as well as a portion of the cervix, and the old cicatricial tissue was got rid of by this means. But before these surfaces could be brought together, it was necessary to make an incision on each side to relieve the tension which would otherwise have existed. When the surfaces were folded together, the line of union extended to such a distance beyond each extremity of the fistula that the fold thus formed was lost in the neighboring tissue. Nine sutures were used. The patient was discharged cured November 18, 1864.

It is frequently more difficult to close a small fistula than to close one where a large portion of the base has been lost. On account of its size, the temptation is always great to remove simply the edges of the opening, instead of extending the scarification in the proposed line of union in the form of a long oval, so as to obviate the formation of the fold at each end.

This woman, about a year after her discharge, gave birth by a natural labor to her first living child. Some eighteen months subsequent to the operation she came with her child to see me. I made an examination for the purpose of ascertaining whether laceration of the anterior lip had again occurred, and was pleased to find that the line of union was perfect. On passing a sound into the uterine canal, I was surprised to find a suture, which, from its length, I was unable to remove until it had been bent upon itself. It proved to be the one which had been passed nearest the os, and which by some means had been turned over backward into the canal, with its end in the direction of the fundus. The portion nearest to the fistula had become buried in the cervix, with over half an inch of the other end free in the uterine canal. She had given birth to her child, and the suture had remained for over eighteen months without its presence causing her any trouble. It has occurred to me that the remaining of this suture, which was passed deep through the neck on a line with the vaginal junction, may have been a fortunate circumstance in preventing a recurrence of the laceration.

URETHRAL FISTULA.

Dr. Emmet has had the largest experience with this form of fistula, and has been, of all the surgeons I know, the most successful in its management. I regard him as the highest authority on this subject.

The only fistulæ of the urethra that I have seen have been those made by myself and others by urethrotomy. In my own cases the fistulæ were made for the relief of dilatation of the middle third of the urethra accompanied by ulceration. The others were made for various purposes—one for the cure of cystitis, one for the purpose of making a diagnosis, and so on. At least this is according to the information received, taking the clinical history given in the literature of the subject. There is nothing in the pathology or method of treatment of fistula in this location that differs from that of vesicovaginal fistula. It is, however, very much less troublesome, there being no incontinence of urine unless the fistula involves the neck of the bladder, the operation for closing the urethral fistula being the same as in the vaginal fistula.

There is no need of anything more being said on this subject. Cases of urethral fistula such as I have referred to would add nothing of value; hence I shall give the history of the following case, which will illustrate urethral fistula caused by injury inflicted during labor.

ILLUSTRATIVE CASE.

Fistulæ involving the Urethra from Laceration or Sloughing. (By T. A. Emmet, M. D.)

First pregnancy; the head born at the end of seventy-four hours; pains then ceased: body delivered fifteen hours afterward by traction. The urethra lacerated entirely through, half an inch from the meatus. The distal portion of the canal so dilated that a large portion of the mucous membrane protruded. The difficulties of the operation consisted in passing the sutures so as to bring perfectly into apposition the two sections of the canal of different diameters. Operation successful.

Mrs. H., aged eighteen, was admitted from Cold Spring, Long Island, April 27, 1867. She had been married two years, and had given birth to a still-born child.

Labor at full term commenced Wednesday, January 24, 1867. The pains, however, were not very strong or frequent until the following Sunday. At 2 P. M. the head was born, but the pains entirely ceased afterward, and the body remained undelivered until Monday morning, when the labor was terminated by traction.

Previous to delivery, the bladder had not been emptied for forty-eight hours; four days afterward the urine began to dribble away. It was not noticed that any sloughs were passed from the vagina.

Pathological Condition.—Directly across the urethra, about half an inch from the meatus, a fissure extended from one ramus to the other, dividing the urethral canal entirely through. The distal portion of the urethra was so dilated that the index-finger could be introduced for some distance within the canal.

The mucous membrane anterior to the neck of the bladder protruded in a hypertrophied mass as large as an almond, resembling a prolapsed anus. In the center of the prolapse, the orifice of the canal just in front of the neck of the bladder remained undilated, and corresponded in diameter to the portion of the urethral canal through the anterior flap.

This condition was an unusual complication, as the prolapsed mass filled up the sulcus, and, although it could easily be returned, it was with great difficulty kept within the canal for the purpose of scarification. The temptation was strong to remove a portion of it with the écraseur, and wait until the surface had healed before operating; this was, however, deemed unadvisable from the extent of cicatricial tissue, and the uncertain amount of contraction which would have resulted.

Operation.—May 7th.—The whole extent of the sulcus was denuded around the edge of the urethra on each side with care, so as not to wound the mucous membrane of the canal. Thirteen sutures were introduced.

The only point of interest was in regard to the manner of passing those nearest the urethra. The sutures 1, 2, and 3 correspond in relation to their entrance and exit on the vaginal surface, Nos. 2 and 3 diverge from the edge of the undilated portion of the urethra to enter at a corresponding point on the margin of the dilated portion.

Six sutures on each side, from the angles toward the urethra, were first twisted; a large sound was then introduced into the bladder to keep back the prolapsed portion while securing Nos. 2 and 3 on each side of the urethra. Lastly, No. 1 was twisted, but, before doing so, the slight prolapse was pushed back and kept from protruding by the point of a blunt hook passed under the suture, and retained until it was secured.

On reflection, it will be evident that, in securing the sutures on each side of the urethra, they must necessarily approximate to a parallel course in relation to each other, and in so doing the excess of tissue would be rolled thus into the bladder. While the dilated outlet was doubtless folded somewhat on itself between the five sutures which embraced the diameter of the urethra, yet, as they were passed so as to bring the edges of the canal at each point into exact apposition, the catheter met with no obstruction, and the excess of tissue soon retracted.

May 17th.—The sutures were removed, and the operation was found successful.

May 29th.—A sound was passed along the urethra, and, after a careful examination, it was found impossible to detect the line of union, as not the slightest irregularity existed. The case was discharged by Dr. Emmet, cured, June 1, 1867.

VESICO-UTERINE FISTULA.

In this variety of fistula the opening extends from the bladder into the uterus, usually into the cervix uteri. It is generally caused during labor, in which the anterior wall of the cervix is torn, and the laceration extends into the posterior wall of the bladder.

During the healing which follows the injury, the lower portion of the wound in the cervix heals, leaving a fistulous communication running from the bladder into the canal of the uterus. The same fistulous opening may be formed in the operation for the purpose of closing the opening in the bladder, and at the same time restoring the laceration of the cervix. Union is secured on the vaginal side of the wound, but a fistulous opening, as described, is formed by the failure to obtain union in the deeper part of the wound.

A case of this kind has already been quoted from Emmet.

The chief points of interest in this form of fistula are in diagnosis and treatment. The symptoms are the same in this as in all fistulæ of the urinary tract, but the physical signs and diagnosis differ. No physical evidences of the presence of the fistula are obtained by examination with the speculum, except that the urine may be seen flowing from the canal of the uterus. If the urine does not flow at the time of the examination, the bladder should be filled with water colored with carmine, which will escape through the canal of the uterus, thus proving the presence of the opening.

To determine its exact location, and obtain some idea of its size, one sound should be passed into the bladder and another into the canal of the uterus, and by careful manipulation the points of the instruments can be made to meet. This will show where the opening is situated, and, by moving the sounds to and fro, an idea of the size of the fistula can be obtained.

Treatment.—The method of closing a fistula of this kind is to divide the cervix uteri and the vaginal wall down to the track of the fistula, and then pare the edges thoroughly, taking care to remove the scar tissue as completely as possible. Sutures are then introduced to close the entire wound in the bladder, vagina, and cervix.

I believe that in this operation there is more likelihood of having troublesome hæmorrhage than in vesico-vaginal fistula, but it can be arrested in the way already described. The following case will make the whole subject clear and complete.

ILLUSTRATIVE CASE.

A lady living in the country was delivered with forceps after having been in labor for forty-eight hours. When the forceps were used the cervix was not fully dilated, and the operator stated that he had much trouble in applying the instrument and delivering. She had incontinence of urine after her confinement. One year afterward she came under my care. There was then a scar running down about three quarters of an inch in the vagina, from a partially healed laceration of the anterior wall of the cervix uteri. The urine could be seen flowing from the cervical canal. A sound passed into the bladder entered the canal of the cervix near the os internum, and could be felt with another sound in the canal of the cervix.

The operation was performed by passing a sound through the bladder into the canal of the cervix, and then, by cutting down through on each side of the scar tissue, a wedge-shaped piece was removed which exposed the track of the fistula. The edges of the fistula were then carefully pared, and the wound closed with sutures first introduced into the wound of the bladder and vagina, and then into the cervix.

The catheter was kept in the bladder for five days, and at the end of the eighth day the sutures were removed, and the union was found to be complete.

CHAPTER LIII.

DISEASES AND INJURIES OF THE URETERS.

INJURIES to the ureters during ovariotomy and hysterectomy are referred to in the description of these operations. The diseases of the ureters caused by various forms of cystitis are discussed in connection with diseases of the bladder.

There still remain for consideration the injuries of the ureters which occur during labor, and ureteral affections caused by neoplasms and other diseases of the pelvic organs.

Affections of the Ureters due to Inflammation of the Pelvic Peritonæum and Cellular Tissue.—Pressure from inflammatory products in the pelvic cellular tissue or on the pelvic peritonæum may so obstruct the ureter as to cause hydro-ureteritis and pyelitis, and, in rare cases, fatal renal disease. In other cases the ureter may become inflamed from the inflammation of the tissues surrounding it. In that case obstruction and its consequences follow in natural order. The completeness and the duration of the obstruction appear to be most marked when the pelvic inflammation runs its course very rapidly and the exudate is large and extensive.

Symptomatology.—The indications of obstruction of the ureter are very obscure. The symptoms and physical signs of a cellulitis or peritonitis so fully command the attention of the observer that the ureter is very often overlooked. During the progress of the primary disease I have observed that the pelvic pain and tenderness extended up the tract of the ureter to the kidney, and that the disturbance of the digestive and nervous systems was more severe than the pelvic inflammation, uncomplicated, accounted for. From this it will be seen that I have, so far, been unable to observe anything in the symptoms diagnostic of ureteral obstruction from this cause.

Physical Signs.—Products of inflammation may sometimes be found by an examination of the urine. All that I know of the physical signs of ureteral diseases and the methods of examination

I have obtained from the writings of Professor Howard A. Kelly. I will therefore quote from his article on this subject in the "Transactions of the American Gynæcological Society" for 1888:

"*By Inspection.*—Inspection is the method proposed by Dr. T. A. Emmet, and is conducted by splitting the vesico-vaginal septum and everting the edges of the wound until the ureteral orifices are exposed, when the ureters may also be catheterized, and their secretions compared. This method resembles the practice of introducing a catheter into the exposed orifices of the ureters in the margin of a vesico-vaginal fistula. It is one of value in serious cases warranting operative interference; nor is the operation, skillfully conducted, to be estimated as in any way grave. The edges of the incisions can be brought together after the examination, and the wound healed at once.

"*By Catheterization.*—The method of Professor Karl Pawlik, of Prague, of catheterizing the ureters free-handed, without preliminary preparation of the patient, beyond the occasional distention of the bladder with a bland fluid, is the one deserving most attention. This method I have both practiced and seen at the hands of Professor Pawlik during the past summer (1888). The patient is placed in the dorsal position, with legs strongly flexed on the abdomen, and a Simon or Sims's speculum introduced, retracting the posterior vaginal wall. The eye at once observes a series of divergent folds starting just back of the neck of the bladder and sweeping laterally and back toward the cervix uteri, corresponding very closely at their point of union to the inter-ureteric ligament, and following in general outline the course of the ureters. A delicate catheter, a cut of which is shown in Fig. 290, is then carried into the bladder, distended with about four ounces of urine, and poised between thumb and index-finger. The position of the end of the catheter is plainly noted by the eye, observing its movements in the vagina as the point sweeps gently along the floor of the bladder. The ureteral orifice is to be sought for about an inch back of the neck of the bladder, and about half or three quarters of an inch from the median line on either side. This position of the ureter, however, is not constant, and can not be relied upon alone. Far more characteristic is the slight tripping sensation given to the point of the catheter as it glides over the ureteral prominence. As soon as this sensation is

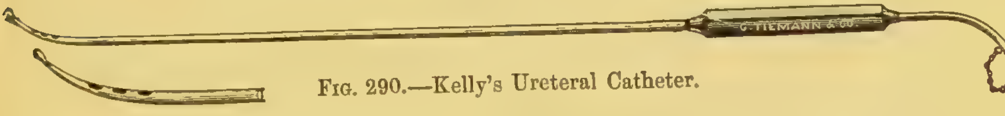

Fig. 290.—Kelly's Ureteral Catheter.

perceived, the catheter must be at once brought back to the place where it was felt, and gentle attempts made to engage its point by repeatedly carrying the handle upward and outward, and the point consequently in the opposite direction. Once caught, the catheter sweeps readily in, and, if lightly held, directs its own course, the fingers simply following. It thus passes some distance unrestrainedly, parallel to the pelvic wall, and the eye observes the anterior vaginal wall being lifted up in advance and to one side of the cervix, forming a distinct pocket on the side on which the ureter is catheterized. This is a point to which my attention was specially called by Professor Pawlik.

"On withdrawing the stopper in the end of the catheter, a few drops of urine run out, when the flow ceases; after a few seconds a few more drops run out, and then cease, keeping up in this way an intermittent discharge entirely characteristic. The catheter can not with safety be pushed beyond the brim of the pelvis. On withdrawing it the sudden drop of the anterior vaginal wall is very characteristic. I have found, as Pawlik states, that very slight force in the cadaver is apt to make false pockets in the mucosa of the bladder. This was especially marked in a subject upon which I experimented this summer in Professor Virchow's laboratory. The ureters were displaced backward to an extreme degree, and, in spite of the fact that I knew exactly where they were, and the catheter would constantly glide over the orifices, it was almost impossible to introduce it. I have at other times succeeded in introducing it at the very first attempt, and yesterday morning, in my office, catheterized the right ureter of a patient who did not know that I was doing more than making an ordinary vaginal examination. I have made a change in Pawlik's catheter, substituting a series of holes for the long fenestrum, which caught and cut the mucous membrane of the urethra in introducing it into the bladder.

"*By Palpation.*—The finger is passed into the vagina behind the internal orifice of the urethra, at the end of the rugose promontory on the anterior vaginal wall, and carried with some exertion up toward the brim of the pelvis, displacing the vaginal wall upward and outward until the pulp of the finger reaches the highest point it can touch, often as high as the brim, but varying according to the greater or less laxity of the tissues and their fixation by pelvic pathological processes. It is then carried downward, stroking the pelvic wall, carefully estimating the character of all structures felt rolling under it. As soon as the observer thinks he has felt a ureter, he catches the cord again with the hooked finger and pulls it down a little, and then slides the finger first toward the bladder, where the ureter is felt to lose itself at the trigonum, and then backward, where it loses itself sweeping around the cervix. I have found that in a certain number of cases the ureter can be felt most distinctly in this position just in advance of the cervix, by placing the patient on her left or right side, when the vagina balloons out and applies itself closely to that side of the pelvic wall which lies undermost; here the ureter can, by a slight effort displacing the vaginal vault upward, be hooked and brought down under the finger, felt with the utmost distinctness, and compressed.

"*By Bimanual Palpation.*—I found, after examining a certain number of cases in which it was impossible to displace the vagina sufficiently to feel the ureter against the pelvic wall, or to feel the ureter with one hand lying like a cord in the connective tissue alongside of the vagina, that it was still possible to outline its whole course with distinctness by a bimanual examination, when it could be picked up between the tips of two fingers and traced from cervix to bladder. In speaking of this to Dr. Sänger recently, he called my attention to the fact that he had mentioned the bimanual examination, and stated that he was daily more fully appreciating its possibilities. The best position to feel for the ureters at the beginning of the bimanual examination is in the oblique diameters of the pelvis, bringing the tips of the fingers as closely as possible together, and rolling them to and fro, keeping near the pelvic wall, watching for the characteristic sensation, when the cord may be traced in either direction. In late pregnancy, the ureters are especially distinct, and seem often to be enlarged. Under favorable circumstances, a thickened ureter can be felt through the thin abdominal walls as it leaves the pelvis and crosses the brim."

Treatment.—As a matter of course, the treatment must be chiefly directed to the primary inflammation which caused the obstruction of the ureter.

I am satisfied that in many of the cases recovery takes place without any direct or specific treatment. Should the ureteral disease persist, relief may be obtained by catheterizing and dilating the ureter and washing it out with a mild solution of borax or sulphate of zinc.

Obstruction of the Ureters by Uterine and Ovarian Neoplasms.—It may be stated here that the ureters become occluded most frequently in patients suffering from cancer of the uterus in its last stages. I have seen several such patients die from uræmia. There is but little that can be done for their relief, and hence nothing more need be said on this subject.

Obstruction of the Ureters due to Uterine Fibromata.—I have several times seen this condition. The symptoms are, pain on the affected side (one ureter only is obstructed, as a rule); the pain extends upward in the line of the ureter to the kidney, a dull, aching pain in the back on that side; there is usually tenderness on pressure, and often a slight sensitiveness on bimanual examination of the kidney on the affected side; by that I mean, when one hand is placed on the back and the other on the abdomen, and pressure is made over the kidney with both hands. Digital examination of the vagina reveals nothing of value except tenderness. The treatment in this condition must largely be directed, as in obstruction from other causes, to the neoplasm that gives rise to it. If the fibroid is impacted in the pelvis, efforts should be made to raise it up into the abdominal cavity. Electricity should be employed in mild cases; but when there is danger, and relief is not obtained, hysterectomy should be resorted to. Indeed, I consider this as one of the most important indications for the removal of the uterus.

ILLUSTRATIVE CASES.

Obstruction of the Ureter from Pelvic Cellulitis.—The patient suffered from menorrhagia; a sponge tent was used to dilate the cervix, after which curetting was performed. This was before I knew how dangerous and useless such tents were, and before antiseptic surgery was fully practiced and taught. The result was a circumscribed cellulitis on the left side. About the fifth day the constitutional symptoms increased decidedly, and the pain extended upward on the left. There was difficulty in urinating, and the catheter was used. The urine was at first clear, but rather abruptly became turbid. This led to an examination which showed the presence of pus. I supposed that a cystitis had been caused by the use of the catheter, but further investigation proved that the pus came from the ureter and kidney. The case was under observation at the time when I was learning how to tell when pus or blood, that was found in the urine, came from the bladder or kidney; and, on that account, I made a number of examinations, all of which indicated that the trouble was in the ureter and pelvis of the kidney. A friend, who also examined the urine, made the diagnosis of pyelitis and acute nephritis. The cellulitis ended in resolution, and the patient recovered and has remained in good health.

Obstruction of the Ureter from Uterine Fibroma.—A lady forty-three years old, who had a very large uterine fibroma which she had carried for years without being much embarrassed by it, was taken with backache and some ill-defined constitutional symptoms, which for the first time compelled her to give up her duties to a great extent, but she did not seek medical aid. She died suddenly, after a convulsion, which was not very well described by the friends who were with her at the time. In fact, there was no clear history obtainable. Post-mortem, I found a large fibroid, and in the cellular tissue around the upper part of the cervix uteri there was much œdema, and what looked like an exudation. Both ureters were dilated, and there were hydro-nephrosis and acute nephritis. All the other organs of the body were normal.

Injuries to the Ureters during Labor.—While engaged in obstetric practice, both hospital and private, I attended several cases which differed from any of the puerperal diseases recorded in obstetrical literature.

During the early years of my investigation very little was learned about these cases except that there was something in their pathology which was not known to me. The manifestations of the affection, as observed clinically and at post-mortem examinations, led me eventually to infer that injury to the ureters during parturition was the cause of the phenomena which I witnessed in these cases.

Pathology.—From a considerable study of the subject clinically, and a meager one of its morbid anatomy, I feel warranted in stating that the pathology of this affection is a contusion or laceration of one of the ureters by the head of the child, the hand of the obstetrician, or more often by the forceps. This contusion gives rise to swelling of the walls of the ureter and the cellular tissue around it, and perhaps some degree of inflammation. This is sufficient to obstruct the ureter and cause hydro-nephrosis, and subsequently pyelitis. As the swelling, and perhaps inflammation, at the point of original injury subside, the pressure of the urine and pus above forces a way through the ureter, and relief follows. This is the explanation of the sudden discharge of pus with the urine. In case the obstruction lasts long, the kidneys become involved to an extent that varies according to the duration of the obstruction. Whenever the ureter is completely blocked and remains so, there is nephritis, and then acute uræmia, which may prove fatal, as already stated.

In a given number of cases, there are some in which there is cystitis, but no marked disease of the kidneys. In others, the bladder is not involved, but the kidney is; while in others all three organs—bladder, ureter, and kidney—are affected. When, as is not infrequently the case, there are some of the usual injuries of the cervix uteri and pelvic floor, and metro-cellulitis follows, the ureters become secondarily affected. Under such circumstances the order of development of the pathological lesions is reversed to some extent, and hence the clinical history is changed, so that the ureteral obstruction and consequent renal disease come later and generally are less dangerous, owing to being less acute and of shorter duration.

Causation.—Predisposing Causes.—There are certain conditions which predispose to injuries of the ureters during labor. When the bladder and terminal ends of the ureters rest low in the pelvis toward the end of gestation, there is more liability of their being caught between the child's head and the brim of the pelvis during labor. In many cases the ureters suffer some impairment of nutrition during gestation (and are more susceptible to injury) that is produced by passive hyperæmia and œdema, and hence a softened state of the pelvic tissues follows. There is in such cases a want of elasticity and resistance to injury. This is seen in the friable condition of the cervix uteri, vagina, and pelvic floor, which renders them so easily damaged. In brief, then, the location of the bladder and ureters, the pre-existing lesion or functional derangement of the ureters, and malnutrition of the tissues in the pelvis, are the conditions which predispose to graver injuries during labor.

Direct Causes.—The fact that the ureters escape injury when dilatation of the cervix uteri is complete before expulsion proceeds, gives a clew to the causation of such injuries. When the membranes rupture before dilatation is complete, and consequently the cervix uteri and bladder are carried down into the pelvis before the advancing head, the ureters are exposed to undue pressure and traction also, and hence are sure to be more or less injured. The dangers are much greater when it is necessary to use the forceps or perform version under these circumstances. The presence of hard fæcal matter in the rectum may also be mentioned among the causes. Faulty methods of operating no doubt add to the dangers. Undue lateral motion of the forceps during extraction must certainly do more or less damage to the adjacent tissues and ureters. Especially is this likely to occur if the cervix uteri and bladder are permitted to descend before the advancing head.

Symptomatology.—The patients are usually primiparæ, or at least have not had many children, the labor tedious, instrumental or manual, and the progress after delivery fairly satisfactory for several days. The lochial discharge may be normal, and the secretion of milk also. The bowels may act well, and the kidneys apparently so. In some patients there is retention of urine or frequent and painful urination. Pelvic pain and tenderness in the lower part of the abdomen are present, but are not always severe at first. These symptoms become more acute after a time, the pain and tenderness increase rather abruptly, and a chill or rigor may occur; distention of the bowels takes place, the temperature runs up, and the pulse is also increased in frequency.

An increase in the severity of the symptoms supervenes in from three to five days, and soon thereafter a quantity of pus, and sometimes blood, appears in the urine. When the discharge of pus begins, the patient is generally relieved to some extent. The pain is less, and the temperature and pulse are reduced a little. In connection with pus and blood renal casts may be found, but this is not invariably the case. The pus continues to be discharged in diminished quantity for a week or more. The bleeding generally subsides in a day or so, and most of the cases gradually recover. In others, acute disease of the kidney appears about the time that the pus begins to be discharged from the bladder, and uræmia follows, and sometimes uræmic coma. Such cases end fatally, as a rule, but I have known one to recover.

Physical Signs.—There is tenderness to the touch along the line of the ureter, and bimanual manipulation of the kidney upon the affected side usually causes a sense of distress rather than pain. In uncomplicated cases a vaginal examination gives negative signs, except that tenderness is detected high up on the side involved.

The diagnosis of injuries of the ureters must be made by the exclusion of the more common puerperal affections, such as peritonitis, cellulitis, or general septicæmia. Metritis is excluded on the grounds that the lochia are normal, that there is absence of tenderness, and that involution progresses as it should. The symptomatic fever is too mild in character to indicate general peritonitis, and the physical signs of that affection are wanting. The tenderness on pressure on the side affected, and the constitutional disturbance not otherwise accounted for, are suggestive of cellulitis, but the evidence, so far as relates to physical signs, of that affection is insufficient, and the subsequent history effectually excludes it.

The sudden appearance of pus and blood in the urine leads one to suspect that an abscess has formed in the cellular tissue and discharged into the bladder. This condition is excluded on the ground that there have been no physical signs of cellulitis; and, furthermore, an abscess never discharges into the bladder in so short a time after the inception of pelvic cellulitis.

In cases complicated with traumatic cystitis, it might be presumed that an abscess had formed in the wall of the bladder; but that is excluded for the reason that the violent symptoms and physical signs found in traumatic and interstitial cystitis are absent. In short, the history of injury to the ureters differs from that of all the puerperal diseases hitherto described in medical literature, so far as I know.

Prevention.—These injuries being difficult to manage, their prevention is of prime importance. When the presence of renal trouble is detected before labor, and it is presumably due to partial obstruction of the ureters, much may be done by rest in the recumbent position, and the judicious use of cathartics, diuretics, and vaginal douches. By improving the circulation and general nutrition of the organs and tissues, the existing ureteral trouble may be relieved and further injuries avoided. During labor much may be accomplished. Full dilatation of the cervix before rupture of the membranes, so that the bladder and ureters may rise out of the pelvis when the head descends, insures comparative safety. In view of these facts the judicious obstetrician, being fairly conscious of the danger to the ureters, will find an additional reason for looking after their interests.

My attention was first given to this matter in order to save the bladder from contusions and displacements, and later I found that this was one of the surest ways of saving the ureters also.

I have many times called attention to the necessity of supporting the bladder during labor, and indirectly the ureters also, but so much attention is bestowed upon management of the perinæum, that the more important dangers to the urinary organs are very largely ignored. This supporting of the parts during labor should be more carefully watched when delivery with forceps is practiced.

Lacerations of the cervix uteri and pelvic floor are unfortunate complications, but they do not compare with injuries of the ureters in gravity of results. The fact is, that the possible danger to the ureters has not occurred to obstetricians, as a rule, but when fully appreciated will have due attention. The lateral motion of the forceps, referred to, is happily not necessary, nor is it practiced by experts, I believe; still it should be avoided, for the sake of the ureters as well as for the reasons given in obstetric works. This would be an uncalled-for statement, were it not for the fact that while the science of obstetrics is most mature, and the art is practiced by the few in a perfect way, yet the practice of the many is often insufficient, to say the least.

Treatment.—The management of injuries of the ureters which have occurred is, I fear, in a very immature state. At least, I have never read or heard of any suggestion regarding treatment, and can only give the results of personal observation.

Being without precept or example, and for years not knowing the pathology of the cases under observation, I treated them as inflammatory affections, without special regard to the location and character of the inflammation, for they were unknown. When a clear comprehension of the nature of the affection was obtained, the treatment was still rather expectant. There is one thing which has appeared to be of advantage, and that is, keeping the bowels free. In fact, free catharsis may be tried if the patient is able to stand it. This I discovered by seeing a case in consultation, in which the attending physician, suspecting septicæmia or obscure peritonitis, had adopted the modern treatment—saline cathartics. The results were good, and I feel confident that it is a useful treatment. When the bladder is involved, much is gained by washing it out repeatedly; this relieves the pain in the ureter and kidney to some extent. Retention of the urine for an unusual length of time increases the suffering, and no doubt also the traumatic inflammation. The catheter does much good if used by a skilled nurse or obstetrician. The unclean metallic catheter, in general use when I first observed such cases, always did harm. Hot vaginal douches have been tried, and when they relieve pain they are curative; but when they increase the suffering at the time of their use, or immediately after, as is often the case, harm may result. In a word, the treatment has been to relieve pain, sustain the patient, and trust that the damages would be repaired before the kidneys were fatally involved. The question of surgical treatment has occupied some time and thought, without my arriving, however, at any definite conclusions.

Catheterizing the injured ureter seemed to be indicated, but I had had no experience with it in acute injuries, because I gave up obstetrics about the time that the practice of catheterizing the ureters was introduced, and I had not acquired facility in the operation; and, lastly, I doubted the safety of such treatment, and felt that it should be tried by an expert first, if at all.

In the class of cases due to inflammation of the tissues around the ureter, the use of the catheter, in the hands of an expert would be of the greatest value. This has been proved by Kelly, Engelmann, and others. But when the ureter is the primary subject of the injury, it is doubtful whether catheterization would be possible, and there would be much danger of the instrument perforating the ureteral wall.

ILLUSTRATIVE CASE.

The history of this patient, from the time of her confinement until her death, was characterized by the symptoms and signs which are given above.

The patient died two weeks after confinement, and, post-mortem, I found an injury of the left ureter about an inch and a half above its lower end. Its walls were so broken down that they could not be separated from the surrounding tissue. The ureter was occluded at the point of injury. There was a circumscribed exudation in the cellular tissue around the injured part. Suppuration had begun at the site of injury, showing that the starting-point of the inflammation was a traumatism of the ureter. Above the occluded portion the ureter was dilated, and filled with pus and urine. There was acute nephritis on that side, together with inflammation of the ureter on the right side, and some infiltration of the cellular tissue around it. The right kidney was also inflamed, or at least markedly hyperæmic. Circumscribed cystitis of a mild character existed. There was not enough in the clinical history, nor in the lesions found, to indicate a grave form of septicæmia. The cause of death was, no doubt, uræmia.

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